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OF

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(January 3, 1901, to February 13, 1902.)

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1902.

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OF THE

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PROCEEDINGS.

JANUARY 3, 1901.

The 157th regular meeting was held at the residence of Mr. E. A. Schwarz, 230 New Jersey avenue N.W. The President, Dr. Gill, occupied the chair. The following members were also present: Messrs. Johnson, Schwarz, Benton, Morris, Kotinsky, Busck, Heidemann, Vaughan, Caudell, Ashmead, Swingle, Currie, Karlsioe, Kuehling, and Hopkins; also, Messrs. Gould and Barber, visitors.

Officers for the year 1901 were then elected, as follows: President, Dr. H. G. Dyar; First Vice-President, Mr. W. G. Johnson, Second Vice-President, Mr. E. A. Schwarz; Recording Secretary, Mr. Rolla P. Currie; Corresponding Secretary, Mr. Frank Benton; Treasurer, Mr. J. D. Patten. Additional members of the Executive Committee: Dr. L. O. Howard, Dr. T. N. Gill, and Mr. C. L. Marlatt. Dr. Dyar was elected as Vice-President of the Washington Academy of Sciences for the Entomological Society.

Prof. Trevor Kincaid, of the University of Washington, Seattle, Washington, and Prof. E. D. Ball, of the Agricultural Experiment Station, Fort Collins, Colorado, were elected corresponding members of the Society, and Prof. H. P. Gould, the newly appointed Entomologist of the Maryland Experiment Station, and Mr. Herbert S. Barber, active members.

Under the head of Short Notes and Exhibition of Specimens, Mr. Caudell showed fifteen larvæ of the Chestnut Weevil (*Balaninus rectus* Say), all taken from one chestnut. Mr. Johnson said that he had taken six or eight larvæ of this species from a single chestnut of the "paragon" variety. Mr. Ashmead asked whether this was the same species of weevil as that which attacks the chinkapin. Mr. Schwarz stated that it was not, and said that the acorn species could at once be distinguished from the chestnut species by the difference in the length of the beak. It was inter-

esting, he said, to watch the males and females during the time of oviposition. Both sexes, to all appearances, perform the same act, the female boring a hole in the acorn in which to place the eggs, the male feeding upon the acorn from the hole bored by the female. In reply to a question asked by Mr. Morris, Mr. Schwarz said that the Chestnut Weevil is not so abundant in the North as in the South. Dr. Gill spoke of a larva of a beetle belonging to the family Calandridæ, occurring in Trinidad, which was there considered a great delicacy by the natives.

—Prof. Hopkins exhibited specimens of a Scolytid beetle, sent to him from South Africa under the name *Xyloterus lineatus*, and an example of its work. This insect, he said, is not this species but a new one, and also represents a new genus which he has called *Scolytoplatypus*. It was named by him from specimens occurring in Japan, and he thinks that it has been introduced into South Africa from that country.

—Prof. Johnson reported two cases of serious injury done by the White Ant (*Termes flavipes* Kollar) in the city of Baltimore. The first case mentioned was in a church. The supporting posts and some of the woodwork above had been very extensively honey-combed by the termites, necessitating a thorough disinfection with carbon bisulphide and more substantial rebuilding at a cost of $1,800. The other and still more serious case of the same nature was in a private residence. Here the insects had worked through three floors and into the cherry library cases on the third floor, completely riddling the timbers throughout. Prof. Johnson exhibited a portion of a timber taken from the house, showing the work of the termites. Similar but less destructive cases, such as that in the Ohio State University and those recorded by Dr. Hagen in New England, were mentioned. Mr. Ashmead expressed surprise that the termite is so prevalent and so extensively injurious as far north as Baltimore. He spoke of an instance of rapid and enormous destruction by termites in the Philippines, where a large quantity of pine lumber from the United States, stored there by our Government, was completely destroyed in less than three months. Mr. Schwarz stated that the true queen of *T. flavipes* has never been found, but that in every case so reported it has proved to be the supplementary queen. These supplementary queens are nearly larviform, and are short-lived;

they are uncommon, though more than one has been found in a single colony. He doubted whether, in view of the roving habits of this species, a true queen really exists with them.

—Prof. Hopkins then read his paper entitled "Notes on the Genus Dendroctonus," of which he has prepared the following abstract for these minutes:

SOME NOTES ON THE GENUS DENDROCTONUS.

By A. D. Hopkins.

(*Author's Abstract.*)

Attention is called to the meagre knowledge of the Dendroctonus and the confusion due to the failure, heretofore, to recognize good specific and secondary sexual characters. The genus is referred to as one of great economic interest on account of its being represented by the most destructive enemies of coniferous trees.

Reference is made to the habits and distribution of the twelve new species named and described, and three restored from synonyms. The new species are named as follows: *D. pinicida*, *D. arizonicus*, *D. monticolæ*, *D. ponderosæ*, *D. keeni*, *D. fletcheri*, *D. piceæperda*, *D. dietzi*, *D. californicus*, *D. shoshone*, *D. wickhami*, *D. borealis*. Those restored are: *D. brevicomis* Lec., *D. punctatus* Lec., and *D. obesus* Mann. These new and restored names, added to those previously adopted for the eight species described from this and other countries, make a total of twenty-four species—twenty-one in America north of Mexico, two in Central America, and one in Europe.

The species are divided by secondary sexual and other characters into two primary, two secondary, and six minor divisions.

Results are given of a detailed study of the ratios of difference in micrometer measurements of different parts of the prothorax, which showed a gradual decrease in the ratios of the anterior width, and the length, to the posterior width, from *D. frontalis*, which represents the maximum, to *D. borealis*, which represents the minimum of this line of variation through the genus.

It was also found that the sum of the mean ratios (or per cent. of differences) of the anterior width to the posterior width, and the length to the posterior width in the different species, gave numbers which expressed, or indicated, the relative value of this composite character, thus determined, in the separation and classification of the species into what appear to be the most natural primary and minor divisions.

The classification based upon the results obtained by the "statistical method" were verified by the ordinary use of secon-

dary sexual and specific characters not available for statistical study. This led to the conclusions, that the sculpture of the prothorax in Scolytidæ is of especial taxonomic importance; that, by the statistical method, progressive lines of variation may be determined; that different stages in this variation may be indicated by the sum of the mean ratios in a series of individuals and varieties, which will not only aid in the accurate separation of the species, but will indicate their natural affinities.

The paper was illustrated by drawings of different stages of some of the species described, together with tables of measurements and ratios, and a chart showing the classification.

This paper was discussed by Messrs. Ashmead, Schwarz, Gill, and Benton. Mr. Schwarz said that he considered the results obtained by Prof. Hopkins as correct, but thought that these results would be more easily comprehended by entomologists and other naturalists if shown in drawings or expressed in terms of descriptive entomology rather than in mathematical formulæ. Dr. Gill thought it hardly safe to draw conclusions in regard to the course of evolutionary development from the data obtained by Prof. Hopkins' measurements. Mr. Benton mentioned that the variation in the length of the tongue in queen bees was made use of in separating the various varieties of honey bees.

February 7, 1901.

The 158th regular meeting was held at the residence of Dr. H. G. Dyar, 1512 Twenty-first street N.W. The chair was occupied by the President, Dr. Dyar. The others present were: Messrs. Ashmead, Howard, Patten, Caudell, Busck, Currie, Chapin, Kotinsky, and Barber.

The Recording Secretary announced the death of Baron Michel Edmond de Selys-Longchamps, the distinguished Belgian entomologist and authority on the Odonata. Dr. Howard, after referring to the Baron's long life of activity both as a statesman and a naturalist, moved that a committee be appointed, including the Chair, to convey the sympathy of the Entomological Society of Washington to the Entomological Society of Belgium in the death of their member and long-time president. The Chair ap-

pointed Dr. Howard and Mr. Currie to serve with him on this committee.

Under the heading of Short Notes, Mr. Ashmead spoke of the surprising entomological results of the Harriman Alaska Expedition. In the order Hymenoptera, he said, less than thirty species were previously recorded from this territory. In his paper upon Alaskan Hymenoptera about to be published, embodying the results of this expedition, 311 species are listed, representing 139 genera and 28 families. Thirty of these genera are new to the United States, and five of the species are European. This collection was made by Mr. Kincaid in two months' time, and upon the coast only. The proportion of truly circumpolar forms contained in it was very small; a great many of the species had a range extending down to Washington and Oregon. Dr. Howard remarked that Hymenoptera and Diptera have a rapid development, and, therefore, occur in large numbers of individuals and species in a country where the summer is very short, whereas other insects, such as Lepidoptera, which develop more slowly, are, in consequence, not so abundant in these places.

—Speaking of the White Ant (*Termes flavipes* Kollar), Dr. Howard thought it remarkable if this species has no true queen, such a queen being present in the European *T. lucifugus*. He inclined to the opinion that a true queen does exist, and would eventually be found. In referring to the damage done by these insects, he related a story told by a German traveller in Rhodesia, who had had his coat and boots eaten up in one night by them.

—Mr. Caudell exhibited the case or burrow of the Purslane larva, *Eudryas gloveri* Grote and Robinson, with a specimen of the larva and the moth into which it transforms. In Oklahoma, on April 16, 1895, he had observed the larva engaged in making the burrow, and he read from his notes a description of the act.

—Mr. Kotinsky reported having taken the scale *Diaspis pentagona* on *Solanum canadense*. Dr. Howard remarked, in reference to this, that Diaspinæ frequently come down off of perennial plants and live through the season upon some species of annual.

—Mr. Chapin said he had observed the butterfly *Terias nicippe* Cram. flying on the 12th of December.

—Mr. Caudell mentioned that he had observed a Calosoma larva engaged in eating the purslane larva before referred to. The beetle larva seemed to be blind. Dr. Howard, speaking of the sight of insects, said that it was by no means proved that insects with eyes see as do human beings. He referred to the work of Von Beethe on the Psychology of Ants, Bees, and Wasps as bearing out this statement.

—The paper for the evening was by Dr. Dyar, and was entitled:

A REVIEW OF THE SPECIES OF HAPLOA.

By Harrison G. Dyar.

The genus Haploa comprises a series of closely allied forms of broad-winged Arctiidæ, formerly referred to the European genus Callimorpha. It has been the subject of considerable discussion among American entomologists. Professor J. B. Smith gave a good account of the genus, and brought the history of its literature down to 1887 in an article published in the Proceedings of the U. S. National Museum of that year. He recognized nine species. Since then the following has appeared: In 1887 Mr. H. H. Lyman published in the Canadian Entomologist, making eight species. His conclusions were much the same as those of Prof. Smith, and the differences of these authors were finally reconciled, the result being shown in Smith's List of the Lepidoptera of Boreal America, 1891, with nine species—*clymene*, *colona*, *lactata*, *lecontei*, *contigua*, *suffusa*, *confusa*, *fulvicosta* and *vestalis*. In 1893 Neumoegen and Dyar published in the Journal of the New York Entomological Society, recognizing but seven species, *lactata* being attached to *clymene* and *fulvicosta* to *lecontei* as varieties. Two older names, suppressed by Smith and Lyman, were revived, and a new name proposed for one of the immaculate forms. *Vestalis* was not identified. In 1896 I published in Entomological News a short article intended to show what was known of the larvæ of these forms; little enough it is. I recognized six species, following the revision published with Mr. Neumoegen, but correcting the confusion that we had fallen into in regard to the white forms. I recognized *vestalis* as the white form of *lecontei*, and *fulvicosta* as that of *reversa* (*suffusa*), which Neumoegen and Dyar had unnecessarily renamed. In 1897 I published in Canadian Entomologist on a good series of the form *fulvicosta*, describing the larva and showing that the genitalic characters used by Prof. Smith were too variable to be reliable. In 1899 Prof. Smith published in Entomological News a description of *Haploa triangularis*, and in 1901 Mr. H. D. Merrick named a new variety of *H. lecontei* in the same journal.

In 1887 the National Museum already possessed a good collection of Haploa, and since that time much additional material has been received, so that all the known forms are represented, many of them in long series. It appears from these that there are but five species, as I tentatively concluded in 1897.

The Haploas present some interesting features. One species is practically without variation. Though its pattern of markings is a slight modification of the one which in another species is highly variable, yet here it is fixed. This is *clymene* Brown. Another species, also very constant, nevertheless shows some tendency to the breaking down of the dark markings, so usual in the genus. This is *contigua* Walker. *Confusa* is more variable and *lecontei* still more so.

This latter runs from a fully-marked form to a white immaculate one, with, occasionally, some production of the buff color. *Colona* is the most variable species, changing not only from fully marked to immaculate by gradual obsolescence of the markings, but also from white to buff in the color of the hind wings, with all combinations of these characters.

The matter is made more obscure by the tendency of the Haploas to occur in more or less isolated colonies, which usually breed true to a certain type, often considerably more restricted in its variation than the species at large. This gives the false impression of a larger number of species than really exists, and makes the correlation of some of the forms difficult. The pattern of markings is essentially similar in all the species, and neither the male genitalic characters nor the larvæ seem to show any strong differential points at times where such would be useful in the separation of the species.

The peculiar extensile, inflated and annulate anal tubes of the male moth, bearing a terminal tuft of yellow hair, described by Siewers and quoted by Smith, are well shown in a specimen or *clymene* before me, and partially in a male of *colona*.

1. **H. clymene** Brown.
    interruptomarginata de Bauv.
    comma Walk.

This form has the markings of *H. lecontei*, var. *harrisii* nov. (described below), a little thickened and rounded and with buff hind wings; but it is perfectly constant and unmistakable, needing no discussion.

2. **H. colona** Hubn.
    carolina Harr.
    a. reversa *Stretch.*
    suffusa Smith.
    b. consita *Walk.*
    lactata Smith.
    c. fulvicosta *Clem.*
    duplicata Neum. and Dyar.
    d. triangularis *Smith.*

This is the most variable species. I have a fine series of 110 specimens from the same locality in Harris Co., Texas, selected from a lot of 2,000 by Mr. Geo. Franck. This shows all the forms listed above except *triangularis*, with nearly all conceivable intergrades. I am, therefore, compelled to unite *colona* and *reversa*, hitherto held apart. The *fulvicosta* race in Maryland, to which I referred in Entomological News, really varies as much as the Texan form, but never into bright colors or distinct markings. It is an albino race of the same species.

Prof. Smith's *triangularis* seems to me but an undersized *reversa* with the costal portion of the bands cut through. I have Texan specimens closely approaching it, though larger. It is doubtless constant in its own locality, but I see no reason for regarding it as a distinct species, unless, indeed, we so regard every colony of Haploa.

3. **H. lecontei** Boisd.
 leucomelas H.-S.
 a. militaris *Harr.*
 b. confinis *Walk.*
 c. harrisii *n. var.*
 d. dyari *Merrick.*
 e. vestalis *Pack.*
 f. smithii *n. var.*

In the typical *lecontei* there are besides the marginal stripes an oblique one from apex to inner margin and three transverse stripes. In *militaris* the basal transverse stripe is obsolete, the median one broken. In *confinis* the three transverse stripes are obsolete. In *harrisii* n. var., the oblique stripe is also broken, leaving only a tooth on the internal margin. In *vestalis* all the dark marks are obsolete. The variety *dyari* has the marks of *militaris* or *harrisii*, but the ground color of both wings is pale buff, not white. This is possibly the form referred to by Strecker as a ♀ *clymene*, which was said to have mated with a ♂ *militaris*, producing "hybrids."

Var. *smithii* n. var. Size of *lecontei* and with the markings of that form, but the upper part of the oblique band and the costal edges of the transverse bands are broken through. Smith's figures 14, 15 and 16 (Proc. U. S. Nat. Mus., X, 1887, Pl. XIV) illustrate it. I am in doubt whether this is a form of *lecontei* or of *confusa*. Were it not for the size, I should unhesitatingly refer it to the latter species, as there is a persistent projecting patch below the end of the cell which seems easily derivable from the normal markings of *confusa*, but with difficulty from those of *lecontei*.

4. **H. confusa** Lyman.
 a. lymani *n. var.*

The typical form is beautifully figured by Lyman (Can. Ent., XIX, 1887, plate, ff. 7, 8 and 9.)

Var. *lymani* n. var. In this form the bands on the basal half of the wing are obsolete, leaving a band from apex, angled below end of cell to tornus and joined to the costal stripe by two short bands, more or less broken. It closely resembles the variety *triangularis* of *lecontei*, but the angle is more obtuse, practically a right angle. It has the size of *triangularis* and *confusa*. Two specimens from Plattsburgh and Pougkeepsie, N. Y.

5. **H. contigua** Walk.

a. lumbonigera *Fitch MS*

This rather constant species may possibly produce a white form indistinguishable from *fulvicosta* and *vestalis*, but I have no direct evidence of it. In some specimens the band from the apex to the transverse band is broken through or obsolete, and for this the manuscript name *lumbonigera*, proposed by Dr. Asa Fitch in his collection, may be kept. I have another specimen in which the transverse band also is broken through, the specimen markedly approaching the variety *harrisii* of *lecontei*. A full series of *contigua* will probably produce some puzzling forms. The National Museum has but 16 specimens.

The large series of specimens in the National Museum collection, showing these variations and the intergrades between the formerly-considered species, was exhibited. Dr. Dyar said it was not improbable that more extensive collections might render a still further reduction of species necessary. In reply to a question as to their food-plant, he said that larvæ seemed hard to get; they are somewhat general feeders. They hibernate as half-grown larvæ and are very local. Mr. Ashmead hazarded the opinion that some varieties might be hybrids between different species, but Dr. Dyar thought it not likely. He thought that there were at least four good and distinct species. Isolated colonies often keep to some peculiar type, though this is not always the case. He thought that there was a tendency toward the formation of species. The three drawers-full exhibited were, he believed, as good a series of Haploa as was ever brought together.

—The hour for adjournment not having arrived, the remaining time was taken up by short notes. Mr. Caudell stated that he had received specimens of *Melanoplus yarrowii* Thomas, from Dr. R. E. Kunzé in Arizona; one male and two females were in the lot. Thomas's original type of the species has been destroyed, and Scudder has redescribed it from specimens taken in Colorado.

—Dr. Dyar stated that there were 15,700 specimens in the Hofmann collection of Lepidoptera recently purchased by the National Museum. Of these, over 9,000 were Tineids, beautifully mounted. This collection, entirely European, includes nearly all the species listed in Staudinger's catalogue as European.

MARCH 7, 1901.

The 159th regular meeting was held at the residence of Mr. Wm. H. Ashmead, 1825 Q street N.W. President Dyar occupied the chair, and there were also present Messrs. Heidemann, Benton, Ashmead, Gill, Howard, Vaughan, Currie, Hay, Kotinsky, Barber and Hunter.

The committee on resolutions regarding the late Baron de Selys-Longchamps reported these resolutions drawn up ready to be sent.

Under Short Notes and Exhibition of Specimens, Mr. Kotinsky showed specimens of the scale insect *Aspidiotus smilacis* Comstock on the underground stems of smilax. They were collected at St. Elmo, Virginia, by Mr. F. C. Pratt, on the 6th of March.

—Dr. Gill, referring to Baron Selys, and in illustration of the latter's versatility, mentioned the work done by him about fifty years ago on birds and mammals.

—Mr. Hunter, upon invitation from the Chair, made a few remarks on western entomologists, spoke of their isolation from one another, and told of some of the work being done by them. He also, as a note, reported having received from Prof. C. A. Hart, of the Illinois State Laboratory of Natural History, nine specimens of the Syrphid fly *Merodon equestris* Fabricius, collected in a green-house at Urbana, Illinois. They belong to a European species and genus, which, he thought, had not previously been recorded from the United States.* The larvæ work in the bulbs of the Narcissus lily.

—Mr. Benton presented a translation made by him from the original Italian of an article entitled: "On the Theory of Par-

* This species has been recorded at points on the Atlantic coast, but not previously from the interior.—Publication Committee.

thenogenesis Among Bees," by Cav. Andrea de Rauschenfels, editor of "L'Apicoltore," of Milan. The Dzierzon theory regarding parthenogenesis among bees having been questioned by several practical bee-masters of Germany and Italy, the zoological department of the University of Freiburg, under the direction of Prof. August Weismann, undertook to make careful microscopic examinations of the eggs of queen bees of the species *Apis mellifera*. Of 29 eggs laid in worker-cells traces of fecundation were found in 23, while 94 eggs laid in drone-cells presented no such traces; in another instance among 62 eggs taken from worker-cells not one was found that did not show fecundation, and of 272 eggs laid in drone-cells one only showed a vestige. Even when, as a test of the accuracy of the microscopic examinations, the labels on material had been purposely exchanged, the results were equally striking and decisive, so that Prof. Weismann concludes: "That it may be taken as proved that the eggs deposited in drone-cells *are normally not fecundated*, while on the other hand those deposited in worker-cells *are always fecundated* and that, therefore, the theory of Dr. Dzierzon remains unchanged."

—The first paper was by Mr. Heidemann, and was entitled:

NOTES ON BELONOCHILUS NUMENIUS SAY.

By O. HEIDEMANN.

In collecting on the trees *Platanus occidentalis* planted on streets near Brightwood, June 10 last, I found the underside of leaves covered with the larvæ of a hemipterous insect in its different stages of development, and was able to identify it at once by the characteristic long and slender rostrum, which reaches to the apex of abdomen, as *Belonochilus numenius* Say, a Lygæid. A week later I secured adult specimens also in abundance on the same trees.

It surprised me to find the insect infesting these planted trees, since it is not recorded as living on sycamore, or as being very abundant; it has been considered as quite rare, and I have in former times found but few specimens by sweeping over the fields.

The insect was originally named by Thomas Say, *Lygæus numenius*.*

*New Harmony, Indiana, December, 1831. (Reprinted in Say's Entomology of North America, LeConte, I, p. 331.)

Later, Prof. P. R. Uhler placed the species in a new genus and redescribed it as *Belonochilus numenius* Say.*

The following November, Mr. J. Kotinsky showed me some sycamore fruits taken at Eckington, November 12, on which he had observed the young larva of a bug. The larva proved to be identical with those I had found previously in early summer on the same kind of trees.

On December 8, I took from the sycamore trees, on which I had collected the insect in the month of June, a number of the fruits, which dangle so conspicuously from long peduncles attached to the bare twigs, and I found on nearly every one of them a colony of the larvæ. The ball-shaped fruit, known to botanists as a head, is composed, as is well known, of the ovaries containing the ovules or seeds. In the crevices or interspaces among the ovaries gathered on the head, the larvæ hide, head downward, in a dormant state, congregating conspicuously on the underside of the fruit, probably adopting this place as the best shelter against the severity of the weather.

Upon warming the fruit of the sycamore with my hand the bugs hidden on it soon recovered from their dormant state and crawled around actively. The larva can hardly be detected in its hiding place, because it matches in color perfectly with its surroundings.

While *Belonochilus numenius* Say may live also on other food-plants, these observations at least establish the fact that it lives on sycamore, and also that it has two annual broods, the fall brood hibernating in the larval stage on the underside of the globose heads.

Mr. Kotinsky, in discussing the paper, said that the larvæ on these heads, when exposed to the rays of the sun, would move around, apparently seeking to find shelter.

—Dr. Howard's paper, entitled "Some Additional Mosquito Notes," then followed. It consisted of the most interesting facts taken from the large mass of information on this subject which has accumulated, through correspondence and otherwise, since the publication of his "Notes on the Mosquitos of the United States."†

These additional notes are soon to be published. The paper was discussed by Messrs. Gill and Hay.

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*Proc. Boston Soc. Nat. Hist., XIX, pp. 393, 394.

† Bulletin No. 25, New Series, Division of Entomology, U. S. Department of Agriculture, 1900.

APRIL 4, 1901.*

The 160th regular meeting was held at the residence of Dr. T. N. Gill, 1608 Q street N.W. Dr. Dyar occupied the chair, and in the absence of the Recording Secretary Mr. Ashmead was appointed Secretary *pro tem.*

—The first paper was by Dr. Dyar, and was entitled:

TO WHAT SPECIES SHOULD THE NAME ACRONYCTA HAMAMELIS GUENÉE BE APPLIED?

By HARRISON G. DYAR.

Guenée gives a comparative description of the moth and a description and figure of the larva under the name *hamamelis*. We have a rather rare species feeding on the witch hazel (*Hamamelis virginica*) in the larval state which agrees with Guenée's larva. It feeds only on this plant, and no other species of Acronycta so feeds to my knowledge. Therefore it would have been eminently proper if the name had been retained for this species. However, Grote, who became our first authority on the North American Noctuidæ, applied the name to an oak-feeding species and named the witch-hazel feeding one *subochrea*. After this, confusion grew apace. Butler identified *subochrea* Grote with *impleta* Walker. Smith, who succeeded Grote as the authority on our Noctuidæ, accepted that determination, but referred both names to *brumosa* Guenée (the larva of which, according to Guenée, is the oak-feeding species called *hamamelis* by Grote). Finally, after a visit to the British Museum and an examination of Guenée's "types," Smith overturned all previous determinations applying the name *hamamelis* to *afflicta* Grote (another oak-feeding species), restoring *subochrea* Grote to the witch-hazel species and proposing a new name (*inclara* Smith) for the oak species called *hamamelis* by Grote. *Brumosa*, which should by the larva apply to this species (*inclara*), is referred to *persuasa* Harv., a species not yet known in the larva.

The name *hamamelis* Guenée has therefore been applied first to *inclara* Smith, and lastly to *afflicta* Grote. In my opinion it is referable to neither, but to the witch-hazel species (*subochrea*). As to *afflicta*, Guenée's description positively contradicts that species. *Afflicta* has pale hind wings, and Guenée says that those of *hamamelis* are "comme chez *rumicis*," that is, dark gray. As to *inclara*, the description is nearer, and it is very conceivable how Grote, not knowing the larva, could have made this ref-

* The minutes of this meeting were lost.—Publication Committee.

erence. Guenée, however, says his species is very near to *rumicis*, with the same design and nearly the same colors, and this is strikingly true of the witch-hazel species (*subochrea* Grote), whereas *inclara* Smith certainly differs somewhat in design. Guenée's so-called types in the British Museum should not weigh against his descriptions. The descriptions were published fifty years ago and are the ultimate standard, whereas the "types," after transportation and arrangements, are only now invoked. Therefore, I conclude that *Acronycta hamamelis* Guenée should be applied to the Hamamelis Acronycta, and the disagreeable misapplication of the name may be hereafter avoided.

—The last paper was by Prof. Cook, and entitled:

EVOLUTIONARY INFERENCES FROM THE DIPLOPODA.*

By O. F. Cook.

A large proportion of evolutionary arguments and theories have been based upon studies of the characters and habits of such groups as the mammals, birds, insects, and flowering plants. Among these higher organisms there are many acute struggles for existence, and many striking specializations and adjustments to environment have been discovered. As primary evidence of extensive adaptation we have the fact of great diversity in habits and habitats among the members of each of these classes of organisms, and it has naturally been supposed that in some manner still unexplained the varied conditions and the selective influences of the ever present competition have induced the changes responsible for the existing variety of form and structure.

As a test or "control" of such inferences no better experiment could have been devised than the Diplopoda or "thousand-legged worms," a class of animals of great antiquity, some Carboniferous types not differing greatly from those of the present day. Since the Coal Period the insects have sought openings in all parts of creation, and have accomplished the most complex and wonderful adaptations to other animals and plants and to each other. They have distributed themselves over the whole earth, not excepting the air and water. The conservative diplopod, on the contrary, has shown no such enterprising tendencies. His ancestors chewed for a livelihood on Sigillarian stumps of Nova Scotia, and though the Sigillarias have been extinct for ages his predilection for rotten

* The inferences here presented were afterward summarized and formulated as "A Kinetic Theory of Evolution." (*Science*, N. S., XIII, 969-978, June 21, 1901.)

stumps is in no way abated. He has not accustomed himself to any other diet than decaying vegetable matter, and he has developed no very acute preferences regarding the origin or quality of this simple provender. Back in the Carboniferous or before, he made a single invention of sufficient effectiveness to secure immunity from molestation until the advent of the nineteenth century naturalist. He anticipated, in fact, the warfare of the future, and is prepared to deliver broadsides of prussic acid and other noxious substances,* which render him an unpleasant companion and an unpalatable morsel. But notwithstanding this effective equipment he has remained an anti-expansionist. Others have striven for possession of the earth, air, and water, while he continues to live because he can subsist on what is not useful to his more enterprising relatives.

Food being plentiful and unvaried, he has had no need to follow the insects in specialized mouth parts. Having no enemies, and living in concealment, he cannot be accused of mimicry or other ruses for self-preservation. He has not invited destruction by injuring others, nor overreached himself by attempting to increase too fast, and thus destroyed his own means of subsistence. His eyes, when not altogether wanting, are only useful in his efforts to keep from exposure to light, which is soon fatal; perhaps it poisons him by disintegrating his defensive ammunition. He cannot be seen by his mate, so that sexual selection cannot be invoked to explain his bright colors,† nor can these be looked upon as warnings to enemies, since he leaves concealment only at night.

The diplopod has, in short, been exceedingly careful to keep outside the undignified struggle for existence. If he has become differentiated, it is on his own motion and not as a concession to enemies or adverse circumstances. The Diplopoda offer, perhaps, the finest of opportunities for the study of variation accumulated without interposition of the principles of selection. Without the introduction of diversity into the life-history of the organism, there have come into existence numerous groups showing great and constant structural differences, but each apparently filling with equal success the same place in the economy of nature.

In the insects we find numerous adaptations of obvious utility occurring within ordinal and even within family limits, but in the diplopods similar reasoning finds but the slightest application. Drawings illustrating the peculiar characters of some members of the African family Oxydesmidæ are submitted herewith.‡ While

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* *Science*, N. S., XII, 516–520, October 5, 1900.

† Eyes are entirely wanting in the large order Merocheta, to which belong nearly all the bright-colored species.

‡ To be published elsewhere with a revision of the Oxydesmidæ.

in some respects unique, they are not more wonderful nor more difficult of explanation than numerous other differences to be found among the members of this class. Such extreme cases are, however, of special interest, since they illustrate more strikingly the evolutionary status of the group. Among the highly adaptive insects it would be extremely rash to deny that any or all structural characters would find an explanation based on natural selection,* and in the Diplopoda we have also many peculiarities of apparent utility which obviously may have been brought to their present perfection in this way. It is, nevertheless, worthy of note that in the Diplopoda such adaptations are almost exclusively sexual, in accordance with the extremely simple ecologic relationships noted above.

The Diplopoda have probably not been threatened with extinction by natural enemies, nor are their numbers kept down by inadequate food supplies. With them the struggle for existence centers rather about the problem of reproduction, their methods being at once primitive and complicated. In the different orders and families the extremely varied copulatory legs have been supplemented by other contrivances frequently similar in function and yet different in structure and origin. Specially thickened, or in other cases unusually elongated, claws, pads of hairs, fleshy soles or cushions, rows of tubercles and other contrivances, have, for example, been variously and independently provided to render the last joint of the legs of males more effective in assisting copulation. The mechanical ingenuity of the group, so to speak, seems to have exhausted itself in this direction, and yet structure and color, although neglected by selection, have by no means remained uniform.

Even in dealing with groups more adaptive than the Diplopoda, writers on natural and other forms of selection have been

* Professor Romanes held that a majority of minor specific differences have no assignable utility, a view which he supported by reference to the color differences of birds and mammals. Had his observations extended to the Diplopoda there would have been no need of such limitations either to shades of color or to specific characters, since in this group structural characters of genera and families are as obviously useless from the standpoint of relation to environment It is true, as pointed out by Professor Romanes, that the birds and mammals "represent the highest products of evolution in respect of organization," that is, they have been subjected to an extended experience of acute natural selection throughout which there would have been a strong tendency against the accentuation of certain classes of structural characters, though, as in the Diplopoda, divergences might continue to accumulate in internal or reproductive structures which do not affect external appearance or efficiency in the struggle for existence.

constrained to admit that their favorite principles must have raw materials to work upon. In other words, the advantageous structure or habit must reach the point of being advantageous without the assistance of the principle which then stands ready to encourage its development. Notwithstanding this defect, the theory of selection as variously analyzed and sub-divided has been and is still advanced as an adequate explanation of the *modus operandi*, if not as the actual cause, of evolution.

In groups where complex adaptations to external environment have taken place, the issues are so mixed that contributions of natural, sexual, germinal, or other forms of selection and their resulting coordinations can scarcely be estimated, even in the most general way. The nicety of many adaptations has so encouraged the imaginative mind that extended flights of fancy have not unfrequently passed as sober theory, if not demonstrated fact. Of a bird or an insect blown to a new region, where it changes its climate, food, habits, and even its enemies, much may be predicated with comparative safety, and with sufficiently numerous factors of undetermined importance supplied by conveniently fortuitous circumstances, selection may be made to appear as the main-spring as well as the balance-wheel of creation. But among the diplopods, at least, the simplicity and uniformity of external adaptation, considered in connection with the quantity and constancy of the internal diversity of the group, seems to warrant a view for which analogy indicates a wider application. Diversity is seen to be essentially independent of selection. Selection accelerates, retards, or even reverses evolution, but by interference in a succession of changes which it does not cause. Segregation, of whatever kind, permits the accumulation of variations which it does not initiate nor direct. The biology of the Diplopoda indicates that facilities in the way of segregation have long been ample for the differentiation, not alone of species and genera, but of families and orders. To prove with reference to any individual case the negative proposition that no selection has intervened would be impossible, but the honest student will find the Diplopoda and other groups of similar ecologic status replete with instances of which the unique dorsal processes of the Oxydesmidæ are a minor example. As a single more general illustration may be mentioned that of the repugnatorial pores, constantly present in some orders and constantly absent in others, but in the Merocheta having the peculiarity of occurring in interrupted series. The presence, or rather the absence, of these organs may well be correlated with habits or environment, but that the omission of the pores of a single segment or two segments from an otherwise continuous series is a matter of selective advantage or disadvantage is very difficult to believe.

Pore Formulæ of Merocheta.

Strongylodesmus	5	...	7	8	9	10	11	12	13	14	15	16	17	18	19
Helodesmus	5	...	7	8	9	10	11	12	13	14	15	16	17	...	...
Gomphodesmidæ (numerous genera), Eurydesmus	5	...	7	...	9	10	11	12	13	14	15	16	17	18	19
Polydesmus and nearly all genera not noted here	5	...	7	...	9	10	...	12	13	...	15	16	17	18	19
Napodesmus, Hynidesmus, Cylindrodesmus, Brachydesmus, Scytonotus	5	...	7	...	9	10	...	12	13	...	15	16	17	18	...
Cynedesmus	5	...	7	...	9	10	...	12	13	..	15	16	...	...	...
Comodesmus	5	...	7	...	9	...	...	12	...	...	15	..	17	18	
Heptadesmus*	5	...	...	...	9	...	...	12	...	...	15	...	17	18	19
Batodesmus	5	...	...	...	9	...	...	12?	...	...	15?	...	17?	...	...
Psochodesmus	5	...	7	...	9	...	...	12	13	...	15	...	...	...	...
Stenodesmus, Biporodesmus, Duoporus	5	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pterodesmus, Xanthodesmus	.	...	7	...	9	10	...	12	13	...	15	16	17	18	19

Since in all other orders of Diplopoda the repugnatorial pores occur in uninterrupted series, that condition may be considered to have been ancestral in the Merocheta as well. The unrelated monotypic genera, Strongylodesmus from Mexico, and Helodesmus from Java, approximate a continuous series, the sixth segment being the only break. The South American genus Eurydesmus, and numerous East African genera of Gomphodesmidæ, have but two interruptions, segments 6 and 8. The formula of Polydesmus is, however, that which on account of its very general prevalence, is looked upon as normal for members of this order, occurring as it does in families the most diverse in other characters. With the exception of those of the genera mentioned above, all other formulæ may be considered as reductions of that of Polydesmus, the absence of pores from segments 6, 8, 11 and 14 being invariable.

Not only is there diversity in the number and distribution of the repugnatorial pores of the Merocheta, their position on the segments and the attendant structural modifications are equally varied and as little likely to have been brought about by any advantage pertaining to the different conditions. Some are close to the margin, some remote; some elevated on tubercles or stalks, others sunk in depressions. But these details are merely illustrations, not arguments, since on no one character or set of characters could a negative proposition be established. The case must rest on the phylogenetic, biologic and ecologic unity of the

* A new genus of Oxydesmidæ from West Africa. The type is *H. connivens* (Cook), described as *Scytodesmus connivens*, Brandtia, p. 10, 1896.

group, viewed in contrast with its structural and evolutionary diversity.

And since such facts are numerous in other fields of biology, there appears to be justification for the view that evolution is a kinetic phenomenon, or an active process of change, from the standpoint of the organism, instead of the result of a passive subjection to external interference in otherwise stable conditions.

The static character of many evolutionary theories is obvious, and even those which depend upon physical or chemical lability as the moving force in vital phenomena, predicate, in effect, a tendency to stable equilibrium. The contrary view is that evolution is one of the normal properties of protoplasmic organisms; change is the law, the various forms of selection and isolation are the incidents. Underneath the minor fluctuations which have been denominated "fortuitous variations," is a continuous motion, though not in a fixed direction. The minor variations may be looked upon as "feelers" for lines of least resistance, but motion there must be. Selection or isolation may accelerate or retard the evolution of the species, but permanent fixity of type the breeders of plants and animals have long since found impossible.

A kinetic theory of organic succession is not without bearing upon other evolutionary questions. For example, the acquisition of new characters, as in the case of the dorsal processes of the Oxydesmidæ, becomes, in a sense, an axiomatic proposition requiring no special explanation apart from the facts of normal reproduction. Heredity to the extent of absolute duplication does not appear as a part of the programme of nature, and impartially fortuitous variation in any character or characters could result only in a stable, non-progressive average—a state of specific equilibrium. To disturb this and make evolution possible, it has been believed necessary that selection or other external stimuli must be universally predicated. Under the kinetic view, variations may be supposed to arise and to be preserved as a part of the normal and necessary process of change, or because they are variations. The nature of the causes of change is not revealed, but it can be understood that the progressive modifications of successive individuals may not be different in kind, or in any way more mysterious than those of the single individual, except from the standpoint of biologists who have invented complicated mechanical theories to account for what have appeared to them as temporary disturbances of otherwise stable conditions.

The utility of a variation is not determined by the organism, but depends upon the conditions encountered, and the testimony of such groups as the Diplopoda indicates the impartial preservation of useful and useless characters. Selection works by elimination and affects the descendants of the survivors only as an active form of isolation—by limiting descent to those in which the

character or power of immediate advantage is already sufficiently pronounced to be of use. But after progressive modification without selection has carried a new feature to the point of utility, it seems gratuitous to predicate another agency as necessary for its further accentuation.

Instead of nicely balanced opposing principles, heredity and variation may prove to be merely two aspects of the same process of gradual change. Organisms react, within limits, to external conditions, some being more adaptive or more plastic than others; they also acquire new characters with greater or less rapidity, but it is not necessary to insist upon any causal connection between these two facts. In some senses acquired characters are hereditary, but it is not necessary, on the one hand, to believe that they originate from external causes, or, on the other hand, that they are predetermined by an inflexible principle of development. Of course, there are other senses in which it is true that no characters are inherited, only tendencies and potentialities, but this does not alter the case when a series of individuals is viewed as a segment of the evolutionary progress of a species.

The history of the individual, like that of the race, variety, or species, shows a process of continuous change or progressive evolution which proceeds in spite of uniformity of environment. Isolation, whether geographical or due to selection or domestication, may influence the direction and rate, but is in no proper sense a cause of the motion.

May 9, 1901.

The 161st regular meeting was held at the residence of Mr. John D. Patten, 3033 P street N.W., the chair being occupied, in the absence of the President and both Vice-Presidents, by Dr. Gill. The others present were Messrs Ashmead, Chapin, Barber, Busck, Howard, Morris, Kotinsky, Patten, Currie, and Sanderson.

Mr. Morris called the attention of the Society to the public exhibition, soon to be held, of the botanical and zoological work of the Washington high schools.

Under Short Notes, Dr. Howard spoke of the many inventions for trapping insects at light recorded at the U. S. Patent Office, mentioning in particular one such device being manufactured in large quantities by a man at Hazeltine, Missouri, for destroying the Codling Moth. He regarded the statistics concerning insects

attracted to light as not very satisfactory, and spoke of the observations of various entomologists. Probably the most thorough investigation of this subject was made on cotton-field insects by a Mr. Mitchell, at Victoria, Texas. Mr. Mitchell captured 24,000 specimens at lights, and a determination of this material showed that about 15,000 of these were made up of injurious species, the remaining 8,000 being beneficial. Of these latter, there were 5,000 specimens of a single species of Carabid beetle. Prof. Riley's experience with light in an orchard went to prove that, contrary to what the manufacturer at Hazeltine claimed, the Codling Moth was not attracted by it. Mr. Ashmead believed that seventy-five per cent. of the insects attracted to lights were injurious. Mr. Sanderson and Mr. Busck considered the benefit of these traps as doubtful, but Mr. Busck thought a trap could be manufactured which would capture moths to the exclusion of beetles; he had used such a trap. Dr. Gill mentioned having observed a remarkable swarm or flight of insects to light in the Island of Trinidad. This flight lasted from twilight to very early morning, and was at its maximum at about 10 o'clock. Among the insects flying were many winged ants. Mr. Chapin said that enormous numbers of insects of all orders, and particularly may-flies, swarmed to the electric lights in Chicago when the arc lights were first established there. In reply to a question asked by Dr. Gill, Dr. Howard thought mosquitoes were not attracted to lights. In conclusion, he said he thought the whole trap-lantern scheme for destroying injurious insects more or less of a fraud.

—The first paper of the evening was by Mr. Sanderson, and was entitled:

NOTES UPON THE STRUCTURE AND CLASSIFICATION OF CHRYSOMELID LARVÆ.

By E. Dwight Sanderson.

Few families of insects, and none among Coleoptera, contain more injurious species or do more damage than the Chrysomelidæ. The rapid spread and voracious appetite of the Colorado potato beetle have made it familiar to every farmer in the land, and many of its near relatives are fast pushing themselves into prominence. The flea beetles, grape and corn root-worms, and the cucumber and asparagus beetles, have caused the loss of millions to

American farmers, and the defoliation of our shade trees by such pests as the cottonwood and imported elm-leaf beetles cannot be valued from a dollars and cents standpoint. A few scarcely known beetles are one day feeding upon a common weed in some out of the way place; the next year we hear that they have ruined some crop of that locality, and in only a few years they have spread over a large area and become recognized as a serious pest. LeConte and Horn have well stated that the function of the family seems to be to hold the vegetable world in check by destroying its leaves; the trouble is that, from our standpoint, the beetles seem to have misinterpreted their duty, and to feel that the superfluous portion is that which man has planted.

Although, owing to their injurious character, more of the immature stages of the Chrysomelidæ have been described than of any other family of beetles, still the larger portion are unknown, and most of the descriptions are incomplete. Furthermore, no systematic study of the larvæ and pupæ has ever been made of the family as a whole, so that the general larval and pupal type of the family has never been described that they might be distinguished from those of other families, or that the different types and species among the seven hundred composing the family (in Boreal America) could be separated.

The work which I will briefly outline to-night was commenced as a thesis at Cornell University. Through the kindness of Dr. Howard and Mr. Schwarz, I have been allowed to study the large collection of larvæ in the National Museum during the past two years. These, with my own few collections and specimens from various parties, have given me quite a representative series. I have felt the need, however, of material from the tropics where this family is best developed, but all attempts to secure it have so far been in vain. The study of larvæ is certainly a new thing to most coleopterists. You will pardon me for quoting in this connection part of a letter from Mr. Martin Jacoby, than whom there is probably no better authority on the Phytophaga, as it brings out this point very strikingly. "I should have been very glad to be able to assist you in your study of the larvæ of the Phytophaga," he says, "but there is absolutely nobody here who ever attempted to collect or study the larvæ of beetles, and I know of nobody abroad. I have no doubt that there are such people, but I have never heard of them. I myself am quite ignorant of the early stages of the Phytophaga, but the more well-known ones have, of course, been described in different works."

When it is attempted to describe the larval type of the Chrysomelidæ we are at once confronted by two obstacles. On the one hand the larvæ of nearly allied families have not been sufficiently studied to make a definition of their characters possible, and on the other, types of the different groups of Chrysomelid larvæ are so distinct

that they have but little in common. In fact, as will be explained later, I am compelled to consider the Chrysomelidæ as a superfamily. There are several characters which I think will definitely separate any of its species from those of other families. The antennæ are of two or three segments; mandibles never elongate; prothorax never broader nor much longer than metathorax; with chitinized notum; thoracic legs always present (except in one or two genera of Hispidæ), short and stout (except in Cryptocephalidæ, which are case bearers), tarsal claw single; tergites of meso and meta-thorax and first seven abdominal segments never forming chitinized plates; ninth abdominal segment never longer than preceding segments (except in Cryptocephalidæ), tenth abdominal segment rudimentary, often bearing one or a pair of prolegs; no dorsal tubercles elongate and lateral tubercles elongate only in Cassididæ; a row of sub-spiracular, lateral tubercles always present; setæ stiff and bristly, never in long tufts.

The antennæ are typically composed of three segments, the two basal segments much flattened and the third conical or quadrate. Arising from the end of the second segment at the base of the third is an accessory digit, which sometimes becomes larger than the third segment. Indeed the latter is sometimes lost, and this digit appears to be the third segment. The third segment can always be distinguished from it, however, by its bearing one to several setæ at its tip. Round, ocelli-like sensoria are often found on the second segment. The ocelli are typically twelve in number, four caudad and two ventrad of each antenna. The two ventral are situated on the genæ, separated from the others by a suture, and it seems probable that originally there were a pair of ocelli on each of three head segments. The position of the ocelli is of considerable taxonomic value, but is a difficult character to determine, oftentimes necessitating boiling or bleaching the head. In two groups, the Donaciidæ and Eumolpini, the ocelli are entirely wanting. In most of the Gallerucini but a single ocellus occurs. This seems to be homologous with the caudo-ventral ocellus of the four caudad of the antennæ, as in certain species between the more typical Gallerucini and Chrysomelini all six ocelli are found, but this ocellus is very much larger than all the rest. The mandibles are typically five-dentate, though in one or two groups they are uniformly tridentate, and in a few genera entire. In some genera the number of teeth varies within these limits for the different species. In Diabrotica and several nearly allied genera, a curious tuft or brush of setæ occurs on the inner margin. The labra are quite variable in shape, but always bear four prominent, stout setæ. The setæ on the cephalic margin furnish good specific and often generic characters, though difficult to study, as they are easily broken off or misplaced. The maxillæ are of the usual type found in mandib-

ulate insects, though quite different in the different groups. In the Gallerucini the galea and lacinia are distinct, and both well developed, but in all others the lacinia is rudimentary, usually being represented by a small prominence bearing a large spine at the inner base of the galea. The setæ upon the palpi and stipes are very constant in position, as they are on the mentum and submentum. The labial palpi are small and of one or two segments, the palpiger being distinct only in the Cryptocephalidæ.

I have not, as yet, succeeded in satisfactorily homologizing the sclerites of the ventral part of the head. To the caudal margin of the submentum and the caudal margin of the occiput is attached a membrane which is continuous with the prosternum, *i. e.*, there is no suture between them. Beneath this membrane just caudad of the caudal margin of the submentum, attached at either side to the ventral margin of the epicranium and with the cardos of the maxillæ articulating upon its anterior margin at either side, is a rectangular, well chitinized sclerite, which seems to be similar to the gula of the adult beetles and yet also seems to bear exactly the same relation to the other sclerites as does the tentorium of the Orthoptera. That it is the same I am not prepared to say. Lying beneath the membrane to which the mentum is attached and connecting the epicranium, it seems to form the floor of the epicranial segment.

Before proceeding to describe the thorax and abdomen it may be well to explain the system of notation which I have used for describing the body tubercles and setæ. But first I wish to request that no one will ask me later on "What is a tubercle or seta," for I freely confess I don't know, though I have tried hard enough to find out. Tubercles, spines, setæ, and hairs or accessory setæ, shade into each other so gradually and their structure is so variable that I am at a loss to know how to define them and have not by any means secured a satisfactory knowledge of their morphology. That the tubercles and setæ of larvæ are of great taxonomic value has already been well shown in the case of Lepidopterous larvæ by Dr. Dyar and others. They have also been used considerably in the classification of Saw-fly larvæ. In the present study I have found them of the greatest value and interest. There seem to be a more or less definite number of setæ in the most generalized larvæ which are variously modified in number and position in those more specialized. When these setæ are surrounded by a thickened or pigmented area, or where they surmount a protuberance of the skin, I have called them tubercles. Often, however, the surface of the epidermis is uniform in texture, merely being divided into areas by folds. In such cases the usual setæ are sometimes distinct and easily recognized, but many times they are surrounded by a large number of small accessory setæ from which they are not distinguishable, as

in Donacia and Criocera. It would seem to me, therefore, that before the student of insect larvæ will be able to use the setæ and tubercles for the purposes of classification understandingly, it will be necessary to know more of their nature, history and origin. Whether the tubercles and setæ of lepidopterous, hymenopterous, and coleopterous larvæ are homologous in any way or whether they had a common origin, seems to me to be a question of importance. Dr. Packard's views as to the origin of the spines and tubercles, and his classification of them, in the Notodontidæ may or may not be correct for that family; it certainly has no bearing upon the similar structures found in the Chrysomelidæ.

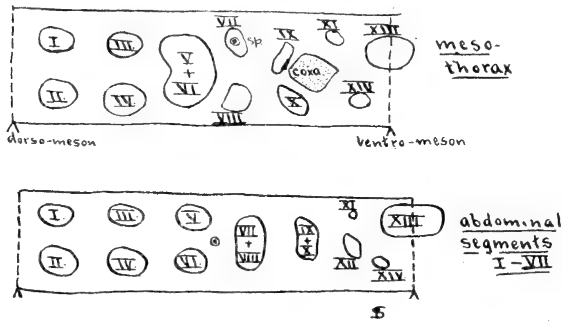

FIG I.—Diagram showing notation of tubercles of the most generalized Chrysomelid larvæ. (Represented as one-half of the larval skin is seen when mounted flat.)

The tubercles as numbered represent those of a purely hypothetical generalized type, and are not so to be found in any one species.

On either annulet of the meso and metathorax below the dorsomeson are two tubercles numbered I, II, III, IV; I and III being cephalic. Below these is a larger lateral tubercle extending across both annulets and outlining the forming wing discs which are immediately beneath, which I term V and VI. Below these are two tubercles, anterior and posterior, VII and VIII. The coxa of the leg articulates slightly with the caudal margin of tubercle IX and caudad of it is X. XI is cephalad of the coxa. XIII dextral and sinistral are usually grown together on the ventro-mesal line. Caudad of them are tubercles XIV, between the coxæ. The abdominal segments, I to VII, differ from the thoracic in that tubercles V and VI are separate, VII and VIII are united, as are IX and X, while tubercles XI to XIV are variously modified. The tubercles of abdominal segments eight and nine are always considerably grown together. On the pro-

thorax, tubercles I to VI are grown together and form the cervical shield; VII and VIII are sometimes distinct and sometimes grown together; IX and X are as on the other thoracic segments; XIII and XIV are usually grown together, forming a chitinized sternum which is cleft on the caudal margin. The tubercles are diagrammed as seen from the dorsal and ventral aspects, as most of the larvæ are naturally flattened. In studying them, when sufficient material was available, I have mounted the skins in Canada balsam.

The thoracic spiracle is always surrounded by or just above mesathoracic tubercle VII. The abdominal spiracles are situated either between or laterad of tubercles V and VI. Spiracles are always found on the first seven abdominal segments in the usual position. In the Hispidæ they are lacking on the eighth, but very large, round spiracles are found dorsally on the ninth segment. In Donacia the spiracles of the eighth segment are much enlarged, are close together near the dorso-meson, and their bases are prolonged into long sickle-shaped horns which aid in respiration.

In some larvæ the eighth abdominal spiracles are wanting. Just below the spiracles, at a variable distance from them, branch off from the trachea leading to the spiracle, two short tracheal appendages, which end blindly, merely forming small pockets or sacs. They are peculiar structures found in almost all of the larvæ examined, whose structure I fail to understand.

The legs are usually short and thick. In one genus of the Hispidæ, Octotoma, they are wanting. The segments seem to be homologous with those of the beetle. The coxal segment is much the largest, and is usually closely appressed to the body. On the outer side it is slightly articulated with a well chitinized tubercle which I have numbered IX, and which seems to be considerably like the trochantin described by Walton. The trochanter is triangular, and the femur and tibia are more or less rectangular in profile. The tarsus is short, somtimes hardly visible. It bears a single claw, and in the Gallerucini a well developed empodium or pulvillus. Such is a brief outline of the characters of the larvæ of the Chrysomelidæ in the broadest sense.

In their classification of the Chrysomelidæ, Leconte and Horn* divide it into eleven tribes, grouping them together as shown on the chart. The larval types of these different tribes are easily recognized, though their relationships appear somewhat different from those of the adults.

The larvæ of the Donaciini feed upon the roots of aquatic plants, are cylindrical, slightly arcuate, tapering slightly cephalad from the sixth or seventh abdominal segment, and sharply caudad;

(* *Vide*, p. 336, LeConte and Horn, Classification of the Coleoptera.)

ocelli are wanting, mandibles tridentate; maxillary palpi of three segments, galea and lacinia present but grown together and highly specialized, forming an organ for piercing the plant tissue; labial palpi of one segment; prolegs wanting; anus situated on the anterior margin of the eighth abdominal tergite; the spiracles of the eighth abdominal segment large, situated dorsally, and their bases developed into horns as already noted; tubercles wanting; setæ occurring in large areas between the folds of the skin.

Of the Sagrini, I have had no larvæ.

Of the Criocerini, I have had but three species of two genera, which genera seem to be poorly defined if judged by the larvæ. These species seem to be more nearly allied to the Chrysomelini, quite distinctly so, though a larger series might show a relationship to the Donaciini. They are cylindrical larvæ, tapering slightly from the middle toward either end; mandibles three to five dentate; ocelli six; maxillary palpi of three segments, lacinia wanting; labial palpi of one segment; anal prolegs present; ventral abdominal tubercular areas protruding ventrad and functioning as prolegs; anus in *Lema trilineata* and *Crioceris merdigera* on the anterior part of the ninth abdominal tergite, though normal in *C. asparagi*. These two species cover the body with excrement. They feed upon foliage.

In the Chrysomelini the larvæ of the genera Chrysomela and Leptinotarsa have the abdomens strongly convex, while the remaining genera are more or less flattened and resemble the Gallerucini in their shape. Ocelli six; mandibles five-dentate; maxillary palpi of three segments, lacinia wanting; labial palpi of two segments; anal prolegs present; a large part of the larvæ having glandular tubercles.

The larvæ of the Eumolpini are nearly allied to those of the last tribe, are subterranean, feeding on the roots of plants, are short, thick, cylindrical, arcuate; ocelli wanting; mandibles tridentate or entire; maxillary palpi of three segments, lacinia wanting; labial palpi of one segment; anal prolegs present; tubercles sometimes faintly outlined, setæ strongly developed.

Different larvæ of the Gallerucini feed upon the foliage and bore into the roots and stems of plants. The most typical shape is that of the imported elm-leaf beetle, though the subterranean and boring larvæ, such as Diabrotica, become very elongate and cylindrical instead of flattened. The Gallerucini seem to be the most generalized larvæ. In a few genera six ocelli are present, in most they are reduced to a single ocellus, while often the ocelli are wanting; mandibles five-dentate; maxillary palpi of three segments, both galea and lacinia present; labial palpi of two segments; the usual pair of anal prolegs forming a single proleg; tubercles well developed, generalized, rarely glandular, sometimes with a metallic lustre; tarsi with a well-developed pulvillus.

Of the Cryptocephalini, I have had no specimens. The Clythrini and Chlamydini resemble each other, and I gather from descriptions also the Cryptocephalidæ, in being case bearers and having the abdomen bent sharply ventrad; ocelli six; mandibles tridentate; maxillary palpus of three segments, lacinia wanting; labial palpi of two segments, with palpiger distinct: legs elongate; prolegs wanting; tubercles wanting; ninth abdominal tergite longer than those cephalad. I have had but few of the larvæ of these three tribes, and but few have been described, but they seem to be most nearly related to those of the Eumolpini.

The larvæ of the Hispini are leaf miners, and resemble those of the Cerambycidæ more than most of the Chrysomelidæ. Each segment is marked dorsally and ventrally by a transverse depression, similar to those found in the larvæ of the Cerambycidæ, around which one may distinguish the usual setæ after considerable study. The caudal margin of the head is produced strongly caudad, to which projection are attached strong muscles also attached on the under side of the pronotum. Ocelli six; mandibles five-dentate; maxillary palpi of one or two segments, lacinia wanting; labial palpi of one segment, ligula reaching anterior of maxillæ, maxillæ and labium sometimes grown together; eighth abdominal spiracles situated dorsally on ninth tergite and much enlarged; prolegs wanting.

The larvæ of the Cassidini are probably the most interesting of all. They are flattened and elliptical in outline, bordered laterally with a row of long barbed spines (tubercles VII plus VIII on the abdomen, VI, VII and VIII on the thorax); arising from the ninth abdominal segment is a two-pronged organ whose prongs are really homologous with the lateral spines, known as the fæci-fork. When bent forwards the tip of this fork reaches the thorax or prothorax; it is usually covered with the cast skins of the larva and a mass of excrement, in which case the larva is almost entirely covered by it and appears on the leaf like a bird dropping. These larvæ have six ocelli; mandibles five dentate; maxillary palpi of two segments, lacinia wanting; labial palpi of two segments; prolegs wanting; head covered by the prothorax, mouth parts inferior.

Upon comparing the characters enumerated it is seen that the larvæ arrange themselves naturally into five main groups, with a classification somewhat as follows:

With fæcifork..Cassididæ.

Without fæcifork.

Abdomen bent sharply ventrad, labial palpi of two segments, palpiger distinct, case-bearers..................Cryptocephalidæ { Cryptocephalini. Clythrini. Chlamydini.

Abdomen straight.

Caudal pair of abdominal spiracles on ninth segment, abdominal tergites and sternites with transverse depressions, body flattened, maxillary palpi of one or two segments..Hispidæ.

Spiracles on first eight abdominal segments, no transverse depression (except fold between annulets).

Prolegs wanting, anus situated on anterior margin of eighth abdominal tergite, bases of eighth abdominal spiracles forming horns....................Donaciidæ.

With anal prolegs, anus not as above..Chrysomelidæ.

Lacinia present, anal prolegs single, claw with pulvillus.................................. Galerucini.

Lacinia wanting, prolegs double.

Labial palpi of two segments, ocelli six.......................... Chrysomelini.

Labial palpi of one segment, ocelli wanting..........................Eumolpini.

Labial palpi of one segment, ocelli six....................................Criocerini.

These five larval types are very distinct. There is less similarity between some of them than between them and larvæ of other families. It seems probable therefore that they indicate a better classification of the Chrysomelidæ, ranking it as a superfamily, and dividing it into five distinct families. This is indeed almost the same classification as that of entomologists early in the last century.

It is obvious that from the many characters which the adult beetles have in common that entomologists have had good reason for considering the Chysomelidæ as but one family and its various subdivisions merely as series. But as Dr. Weismann has well shown in his "Studies in the Theory of Descent," treating of lepidopterous larvæ, the generic and family relationships are most clearly to be discerned in that stage of insects in which these classes differ most in their habits. He there points out the incongruities between the larvæ of Lasiocampa, Clisiocampa, and allied genera, and most of the other genera then included in the Bombycidæ, and makes the query whether or not morphological differences do not exist in the adults so that these genera should form a distinct family. Further study of the moths has shown several distinctive characters, notably the wing venation, and the

Lasiocampidæ are now ranked as a family. He also shows that genera based on larval and imaginal characters more nearly coincide in their relation to each other than higher groups so founded. The following passage seems especially pertinent to the case in hand: "In families there is again an increase of irregularity. Although larval and imaginal families generally agree, there are so many exceptions that the groups would be smaller if they were based exclusively on the larval structure than if founded on the imagines (Nymphalidæ, Bombycidæ)." "If we turn to the groups of families we find a considerably increased incongruence; complete agreement is here again rather the exception; and it further happens in these cases that it is always the larvæ which, to a certain extent, remain at a lower grade, and which form well defined families, but these can seldom be associated into groups of a higher order, having a common character, as in the case of the imagines (Rhopolocera)." The numerous instances further sited by Dr. Weismann in different orders further confirm this view, whose truth must be apparent. Now the adults of all the Chrysomelina feed upon foliage externally, but the larvæ are much more variable in their habits, far more distinct in structure, and thus, as might be expected, show more clearly their relationships. As an example, LeConte and Horn have classed the two tribes, Hispini and Cassidini, as Cryptosomes upon their having "front inflexed, mouth inferior." If, as they state, the larvæ of both these tribes had the habit of covering themselves with excrement, their relationship would seem more clear, but such is not the case. The two larvæ are very dissimilar, the latter approaching the Erotylidæ and Coccinellidæ, while the former resemble those of the Cerambycidæ, between which there is certainly no very great similarity. This is the most striking instance in which the classification of the larvæ differs from that of the adults, though others are numerous. Inasmuch as the characters used to separate many groups of the Chrysomelina are confessedly unsatisfactory, it would seem that the relationships so clearly exhibited between the different groups of larvæ may be of considerable value in securing a natural classification, or, if that be not possible, at least add to our knowledge of the phylogeny of this large group of beetles.

This paper excited much interest, and was discussed by several of the members present. Dr. Gill said that one of the families should be called Cassididæ, instead of Cassidæ,* this being the proper family name derived from the genus Cassida; there was also a family of Gasteropod Molluscs called Cassidæ. He asked if the

* This correction has been made in the body of the article.—Publication Committee.

imagines bore out the classification of the larvæ. Mr. Sanderson replied that, roughly, they did; he was not ready, however, to draw sharp conclusions, not having examined sufficient material. Mr. Ashmead showed how the larval characters of Hymenoptera bore out the classification of the adults, and also spoke of the value of the position of the ocelli in larval Homoptera and of their development into the compound eyes of the adult.

—The second paper, "General Notes," was by Dr. Howard. In the March number of "Entomological News," Prof. John B. Smith had recorded some observations which seemed to contradict the statement made by Dr. Howard that the larvæ of Culex did not stay under water longer than one minute, but came frequently to the surface to breathe. Having doubts as to the correctness of Prof. Smith's determination of the larvæ, he sent to him for specimens. The first lot received was *Culex pungens* while the second and following lots were Aëdes. This latter genus, being possessed of tracheal gills, can breathe under water, and Dr. Howard had no doubt that all of the specimens observed by Prof. Smith to remain for any length of time under water belong to this genus.

October 24, 1901.

The 162d regular meeting was held at the residence of Mr. E. A. Schwarz, 230 New Jersey avenue N. W. Dr. Dyar occupied the chair, and the following members were also present: Messrs. Kotinsky, Caudell, Morris, Hay, Busck, Barber, Ashmead, Gill, Heidemann, Patten, Schwarz, Currie and Benton. Mr. William R. Reinick, of the Wagner Institute of Science, Philadelphia, and Mr. W. V. Warner, of Washington, D. C., were present as visitors. The name of Mr. A. A. Doolittle, Central High School, Washington city, was proposed for membership, and he was elected. The resignations from corresponding membership of Messrs. J. W. Toumey and William J. Fox were read and accepted.

Under Short Notes and Exhibiton of Specimens, Mr. Caudell showed blown larvæ of ants, ant lions, and various other insects, which are not usually inflated, prepared by himself. A discus-

sion followed as to the relative value, for purposes of study, of alcoholic and inflated larvæ. Mr. Schwarz considered alcoholic preservation best for coleopterous larvæ, while Dr. Dyar said that in the Lepidoptera inflated specimens were by far the best. Speaking of ants, Mr. Ashmead recommended for study the papers on these insects by Prof. Wheeler, of the University of Texas.

—Mr. Schwarz exhibited the work of a Scolytid beetle (presumably *Dendroctonus approximatus* Dietz) in portions of the bark of *Pinusponderosa*, illustrating how quickly a tree may be killed by this pest. These specimens were obtained at Flagstaff, Arizona, during the past summer. This species is the only one which is fatal to the pine in that locality, the other Scolytidæ producing only secondary injury.

—Mr. Schwarz also reported that Mr. Barber and himself had taken two species of Myrmecophilous Staphylinidæ at Las Vegas, New Mexico, last summer, in the nests of *Liometopum* species. These were described by Wasmann in Wiener Entomologische Zeitung, XX, pp. 145 to 147, 1901, as *Dinardilla liometopi*, and *Apteronina schmitti*, new genera and species, from specimens collected at Cotopaxi, Colorado, by Prof. Jerome Schmitt.

—Mr. Heidemann showed two adults and a larva of the Coreid bug *Stachyocnemus apicalis* Dallas, collected by him last August in a sandy field near Washington city. This species, though of wide distribution, having been recorded from Florida, Texas, Mexico, Dakota, Colorado, and Missouri, has not before been reported from the District of Columbia, and may be considered as quite rare.

—Mr. Hay showed one specimen of the butterfly *Neonympha gemma* Hubner, which was taken by him in Nickajack Cave, Tennessee. This seems to be the first butterfly recorded from a cave.

—In regard to the Tree Crickets, Mr. Caudell stated as his opinion that the common and injurious species in the northern States was *Œcanthus fasciatus* Fitch, not *niveus* Serville.

—Dr. Dyar exhibited specimens of the moths and larvæ of *Triprocris smithsonianus* Clem., and presented a description of the larva, the first larva of the genus to be described, as follows:

DESCRIPTION OF THE LARVA OF TRIPROCRIS SMITHSONIANUS CLEMENS.

By Harrison G Dyar.

Found at Salida and Otis, Colorado, July 25th.

Pyromorphid shaped, rounded, flattened elliptical. Head rounded, bilobed, elongate, the clypeus touching the large membranous vertical triangle, shining brown, sutures darker; entirely concealed in the hood of joint 2. Hood hairy. On joints 3 and 4, five warts; on 5 to 12, four warts; on 13 a large diffuse wart. Subdorsal warts V-shaped, the lateral oblique, lower subventral small, the rest large, low, pale whitish, many haired with short brownish black-tipped bristles and a few longer pale hairs; only one or two such from the upper two warts. Diffuse black lines dorsal, lateral, stigmatal and subventral, all the rest of the space between the warts shaded in pale brick red, except along warts iv+v where whitish prevails. Feet on joints 7 to 10 and 13, normal, short, with a few hairs outwardly. Spiracles round, pale, conical centrally. At maturity the dorsal black band was widened intersegmentally, with paired white, glandular spots in the position of depressed spaces (1) of the Cochlidiidæ, white-edged, the edge passing through the center of warts i+ii; below this a pale salmon-colored band; lateral black line narrow, waved, white edged; a narrow salmon line; stigmatal black band dotted, broadly white below; subventral black line dotted, without distinct white edging; venter pale, thorax ventrally and feet orange; traces of a broken ventral black line.

Cocoon in the ground or leaves, white, of flocculent silk, opaque, flattened, as usual in the group.

Food plant: *Allionia nyctaginea*, kindly determined by Mr. C. L. Pollard.

—Mr. Schwarz showed twigs covered with some unknown kind of insect eggs, collected by him at Williams, Arizona, last July. Mr. Pergande, he said, had found a single larva among them which was pretty certainly that of a Dipteron (perhaps a species of *Asilus* according to Mr. Pergande).

—Mr. Morris stated that during the past summer he had observed at two places on Stein's Mountains, Southeastern Oregon, swarms of a Locustid (*Anabrus purpurascens* Uhler). They were defoliating everything in their path, even the "salt-bushes." The larger swarm covered an area of about one hundred square yards.

—A paper submitted for publication by Prof. A. D. Hopkins was then read by title. It is as follows;

A NEW GENUS OF SCOLYTIDS FROM FLORIDA.

By A. D. Hopkins.

Erineophilus gen. nov.

Fig. 2.

Head medium in size; not rostrate, front narrow and fringed in the ♀; broader, convex and nearly smooth in the ♂; anterior margin (epistoma) (Fig 2, *g*) strongly produced over base of mandibles; eyes oblong, narrow, closely joined to antennal scrobe and extending more than half their length above it. *Maxilla* (Fig. 2, *b*) short, broad; cardo more than one-half as long as remaining portion and less than one-half as broad at base; stipes short continuous with sub-galea but with distinct suture between it and the palpiger, which is large, stout, and as long as the three-jointed palpi, its outer angle bearing numerous long hairs, the tips of which extend beyond the tip of the palpus; galea narrow, as long as palpi, and armed on the inner edge with closely set compressed teeth with rounded tips; palpi stout, distinctly three-jointed, the joints nearly equal in length; joint 1 nearly twice as broad as 2, which is also nearly twice as broad as 3, which is truncate at tip; 1 and 2 with a few hairs on the outer portion toward the anterior margins. *Mentum* (dorsal view) (Fig. 2, *c*, *d*) short, rather broad, anterior portion broader than base; ligula short, conate, not extending to tip, sparsely clothed with short hairs; palpi difficult to define, appear to be two-jointed and differ in the sexes as indicated in the figures. That of the ♂ (*c*) appears to have the second joint globular and the tip concave, and the inner edge armed with a small chitinous piece, while in the ♀ (*d*) it is narrower toward the tip, obliquely excavated and the surface chitinous. *Antennæ* (Fig. 2, *a*): funiculus six-jointed (appears to be five-jointed in some examples), joint 1 large, globular, nearly as long as the others united, 2–5 about equal length, 5–6 compressed, closely joined, irregular and difficult to determine, except in balsam under high magnification; club oblong, compressed, broadly rounded from middle to tip, narrowing toward base, divided on its outer face by two sutures, the first nearly straight, the second strongly curved, inner surface shining not annulated. In balsam the first suture shows a prominent chitinous piece, as in figure; the remaining surface, especially near the suture, marked with numerous punctures, and clothed with long hairs which rise from minute granules. Scape simple, clavate, scarcely as broad as the first joint of funiculus.

Front tarsi (Fig. 2, *f*) slender, shorter than tibiæ, joint increasing in length from base, 1 short and constricted in middle, 2 broader at tip, 3 simple, oval-cylindrical, 4 short and narrow but distinct, 5 rather stout at tip and as long as 2 and 3 together.

Front tibiæ (Fig. 2, *e*) stout, broad at base, slightly broader at tip, upper or outer edge armed with three or four stout, broad, triangular teeth, connected with transverse elevations on the outer face, and increas-

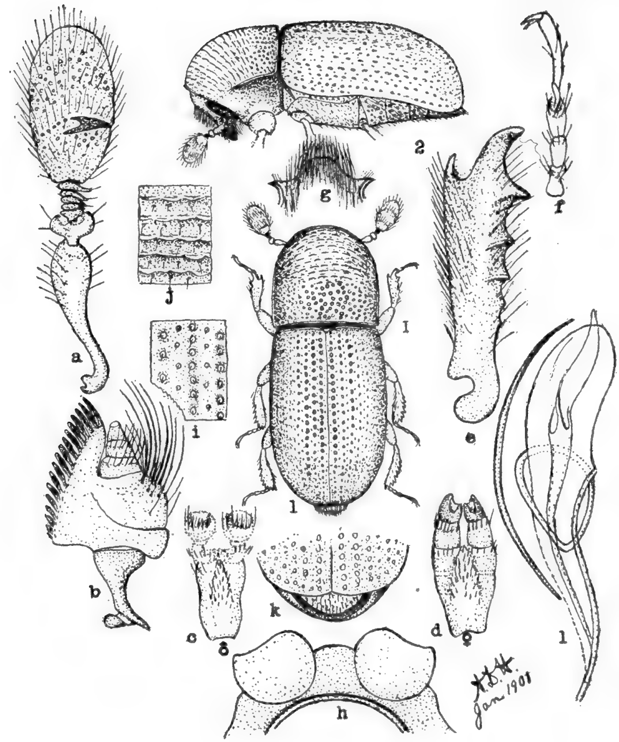

Fig. 2.—*Erineophilus schwarzi* nov. gen., et sp. 1. Adult, dorsal view. x 22.7. 2. Adult ♀ lateral view. x 22.7. *a*. Antenna (as seen in balsam). x 133.4. *b*. Maxilla. x 133.4. *c*. Mentum ♂ (palpi imperfectly defined). x 133.4. *d*. Mentum ♀. x 133.4. *e*. Tibia, showing upper surface. x 133.4. *f*. Tarsus. x 133.4. *g*. Epistoma. x 133.4. *h*. Prosternum and coxæ. x 66.7. *i*. Section of elytra. x 66.7. *j*. Section of pronotum. x 66.7. *k*. Tip of elytra and abdomen, showing pygidium and edge of last ventral segment. x 50. *l*. Male organ. x 133.4.

ing in size toward the outer angle, which is strongly produced into a broad outward and upward curved mucron; inner edge nearly straight, pubescent, angle with cylindrical upward curved tooth. Middle and hind tibiæ narrow at base, dilated towards tip, and evenly serrated on outer edge; outer angle not produced but broadly rounded to inner angle.

Front coxæ (*h*) widely separated, large, almost contiguous with anterior margin of prosterum. Middle and hind coxæ small.

Prothorax: sternum (*h*) broad, sub-quadrate; episterum with posterior portion (2) excavated for reception of femur; notum slightly shorter than broad, sides parallel and margined to middle, anterior portion

broadly rounded, declivous, concealing the head from above, roughened with transverse rugosities (*j*) posterior surface smooth, shining, punctured, basal angle acute.

Mesothorax: episternum (2) large, opaque; epimerum very small, narrow, obscure.

Metathorax: episterum narrow, elevated, base strongly oblique, ventral angle acute; sternum large, with short median groove toward the posterior margin, in ♀.

Abdomen: ventral segments 1 and 2 equal width, both together as long as the others united, 3, 4, and 5 equal length, sutures nearly straight, posterior margin of 5 concave, not strongly reflexed as is usual; pygidium, (*k*), prominent and extending beyond tip of elytra in both sexes, but much more pubescent in the ♂, strongly punctured in the ♀; propygidium smooth, chitinous and the posterior margin more shining in the ♂, not chitinous in the ♀.

Elytra: sides parallel or faintly rounded for more than half their length, slightly wider in middle than prothorax, not elevated or roughened at base, but faintly margined; surface nearly smooth, shining, striæ and interspaces punctured in rows, declivity plain.

Type of genus, *Erineophilus schwarzi* described from 18 specimens (11 ♀♀ and 7 ♂♂), submitted by Mr. E. A. Schwarz. Two specimens of each sex were dissected, the remaining 9 ♀♀ and 5 ♂♂ are in the type series, two retained by the author, and the others, including the ♂ and ♀ types, are in the National Museum Collection (No. 6242).

The species upon which this genus is founded may be further described, as follows:

Erineophilus schwarzi sp. nov.

Female type (Cocoanut Grove, Fla., April 26).

Length, 1.7 mm.*; color, yellowish-red; posterior portion of prothorax to abdomen, darker; head and ventral surface dark; legs and antennæ yellow. *Head* with front convex, middle of convex surface polished, shining, densely fringed with long yellow hairs, which extend around the anterior margin almost concealing the epistoma and mandibles. Head withdrawn so that posterior portion cannot be seen. Base of *prothorax* emarginate. Posterior portion of *proëpisternum* shining. Elytra shining, margined at base, surface glabrous, except on sides which are faintly and sparsely pubescent; striæ punctured but not impressed, interspaces not elevated and with median row of punctures slightly smaller than those of the striæ; declivity not steep, smooth, punctures fine, apical margin slightly retuse, exposing the pygidium; ventral segments 1 and 2 distinctly punctured.

Male type (Cocoanut Grove, Fla., September 25).

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* See p. 37, note.

Length, 1.5 mm.*; equals description of ♀ in all respects except the head, which has the front convex, smooth, sub-opaque, faintly punctured and with faint median line; epistoma clothed with long hairs, extending over base of mandibles.

The characters here defined vary but slightly in the other examples before me. The ♂♂ are generally smaller and vary more in size. When exposed the posterior portion of the head is found to be sub-opaque and punctured to vertex. The elytral striæ and interspaces are slightly more distinct in some examples than in others.

Systematic Position of the Genus.

This genus seems to represent a distinct group coming between Blandford's groups Scolytides and Hexcolides. These three groups may be distinguished as follows: a

A. "Anterior tibiæ produced at the upper apical angle beyond the tarsal insertion into a mucro, or bifid process" (Blandford); upper border unarmed. Third joint of tarsi bilobed.

SCOLYTIDES.
(Scolyti.)
(Comptoceri.)
(Bothrosterni).

B. Anterior tibiæ strongly produced at the upper apical angle into an upward curved process; upper border armed. Third joint of tarsi not bilobed.

ERINEOPHILIDES.
(Erineophili.)

C. "Anterior tibiæ not produced beyond the tarsal insertion" (Bland.)

HEXACOLIDES.
HYLESINIDES.
TOMICIDES.

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* Detailed measurements and ratios.

1. 9 ♀♀ average 1.66 mm. Maximum 1.75. Minimum 1.50.
2. 5 ♂♂ average 1.53 mm. Maximum 1.65. Minimum 1.30.
1. 9 ♀♀. Mean ratio of length of prothorax to width, 94%.
Mean ratio of length of prothorax to length of elytra, 59%.
Mean ratio of width of elytra to length of elytra, 69%: mean 74 (expresses specific value of composite character.)
2. 5 ♂♂. Mean ratio of length of prothorax to width, 95%.
Mean ratio of length of prothorax to length of elytra, 58%.
Mean ratio of width of elytra to its length, 69%; mean 74 (expresses specific value of composite character.)

The declivous asperated pronotum concealing the head from above indicates affinites with Tomicides, but the mouth parts, tibiæ, tarsi, widely separated anterior coxæ, and exposed pygidium furnish characters which separate it from this and all other groups as at present recognized.

I am under obligations to Mr. E. A. Schwarz for the privilege of describing this interesting genus and species. He also suggested the generic name.

In discussing the paper Mr. Schwarz said that this species was of economic importance, as it bored under the bark of branches of the Banyan trees (*Ficus*), thus killing them.

The first paper read was that of Dr. Dyar, entitled:

A NEW FORM OF CLISIOCAMPA FROM COLORADO.

By Harrison G. Dyar.

Clisiocampa fragilis, the common species of this genus in Colorado, feeds upon a variety of plants, including wild cherry, rose and aspen, occasionally, but not normally, on the oak. A larva was met with sparingly in the Platte Canyon near Denver, Colorado, feeding exclusively on the oak and differing in habits and coloration from the common form. Later it was seen in abundance at Sedalia, Colorado. The species is nearly allied to the Californian *C. constricta* Stretch.

The eggs were found on the lower twigs of the dwarf oaks in small rings without any covering; these were eggs of the previous season. The larvæ fed at first in colonies, spinning no tent, only just enough web to hold them to the branches as with *C. disstria* of the Atlantic States. Later they wandered separately in search of the young leaves which were all they would eat. The larva has a black head, blue powdered in the sutures. The body is as usual, short haired, the lateral tufts as in *constricta* but more reddish, less contrasting. Orange markings well developed, consisting of a dorsal band constricted at the anterior third of the segment, marked with black and obscurely blue centered; a subdorsal and a lateral line, practically continuous, running into pale orange transverse mottling in the incisures; traces of substigmatal orange. Blue markings reduced; two lateral patches, the posterior one a transverse line cut by the subdorsal band; subventral region washed in pale blue. The black ground color on the sides, especially of joints 3, 4 and 12, appears as conspicuous transverse lines. Hairs reddish, scarcely tufted dorsally, orange or white on the sides.

The moths differ in color in the sexes as with *C. constricta*. The male is pale, two brown, narrow lines on the fore wings, the hind wings more or less shaded with brown. Female brown, two dark paler-edged lines on fore wings, the hind wings brown shaded. There is more of a yellowish tint to the wings than in *C. constricta*, the brown irrorating scales offering more contrast to the ground color.

We would call this species, or local race of the Californian species, *Clisiocampa tigris* from the striped markings of the larva.

Eggs, larvæ and imagoes were exhibited. Mr. Caudell thought this species was of some economic importance, as it defoliated the scrub oaks. Dr. Dyar said it was reported to him as common some years, other years less so.

The second paper was then presented by Mr. Schwarz, entitled, "The Coleoptera of semi-Tropical Florida."

The beetles of semi-tropical Florida were twenty years ago estimated at 500 species. Now, however, 1,500 species are known from there, of which 227, representing 182 genera, are characteristic. The semi-tropical fauna is found in isolated spots on the east and west coasts of Florida, on some of the Keys, and through the West Indies, Venezuela, and Yucatan. This fauna embraces two families not found elsewhere, 157 species of wide distribution, 61 species belonging to the Austroriparian region, and 44 not found outside of the peninsula of Florida. Of these last, twenty-three only belong to the semi-tropical fauna. He compared this fauna with that of Baja California.

The paper was discussed by several of the members. Mr. Ashmead referred to the term "precinctive species," used by Dr. David Sharp in the sense of "characteristic." Mr. Schwarz thought "characteristic" a better term.

November 14, 1901.

The 163d regular meeting was held at the residence of Mr. Wm. H. Ashmead, 1807 Belmont avenue N.W. President Dyar occupied the chair. The other members present were Messrs. Schwarz, Pratt, Stiles, Benton, Patten, Barber, Heidemann, John B. Smith, Howard, Kotinsky, Busck, Caudell, Currie,

Doolittle, Sanderson, Ashmead, and Quaintance. Messrs. F. A. Merrick, H. T. Fernald, Franklin Sherman, Jr., C. B. Simpson, and William G. Dietz, were in attendance as visitors.

Mr. Franklin Sherman, Jr., of Raleigh, North Carolina, was nominated for corresponding membership, and Mr. C. B. Simpson, of the U. S. Department of Agriculture, for active membership. The resignations of Mr. Frank E. Chapin and Mr. Theo. Holm, both on the list as active members, were received and accepted.

Under the head of Short Notes and Exhibition of Specimens, Dr. Howard mentioned the larva of a grain moth, *Pyrausta farinalis* Linné, which had been sent him from a place out west in material said to have been voided by a child. Dr. Stiles then reported upon other matter found in the same material. This, he said, after some study and conjecture, proved to be partially digested cells of the banana, although possessing a superficial resemblance to segments of the tape-worm, *Diplidium caninum.* A half dozen similar cases had previously been referred to the Agricultural Department.

—Mr. Heidemann exhibited some seed pods of the sycamore upon which were eggs of the Lygæid bug, *Belonochilus numenius* Say, together with alcoholic larvæ and eggs of the same. They were all on the under side of the pods, some of them seeming to be parasitized.

—Mr. Merrick showed several specimens of the moth *Pseudanaphora mora* Grote, taken by him at New Brighton, Pennsylvania, on October 12 of this year, and a specimen of an undetermined species of Noctuid, no doubt strayed from the West Indian or Central American fauna, captured by him at the same place on August 5.

—Mr. Schwarz exhibited specimens of a Coccinellid beetle *Exochomus* (*Axion*) *plagiatus* Olivier, found feeding upon a species of *Lecanium* on oak (*Quercus arizonicus*) at Prescott, Arizona, on the 19th and 20th of last June. This beetle was described from Mexico without more definite locality, and its exact home is therefore not known. Since the species occurs in enormous numbers of specimens, Mr. Schwarz thought it could be used for transportation into the olive orchards of Southern California as a natural enemy of the Black Scale (*Lecanium*

oleæ). Dr. Howard said that he considered this an important discovery, and this beetle's utility in combatting the Black Scale should be tested, as no remedy for this pest had yet been found. Prof. Smith remarked that *Exochomus tripustulatus* fed in some numbers upon the San José Scale in New Jersey.

—Dr. Stiles called the Society's attention to the fact that the Florida University last summer conferred upon Mr. Ashmead the master's degree in recognition of the importance and excellence of his scientific work.

—Dr. Dyar showed a co-type of *Chionobas katahdin*, recently described from Mt. Katahdin, Maine, by Mr. H. H. Newcomb (Ent. News, XII, 206, 225, plate 12, 1901), presented to the National Museum by Mr. Newcomb. With it specimens of *C. norna*, its variety *fulla*, *C. taygete* and *C. semidea* for comparison, and a series of specimens collected by Mr. W. J. Peters on the north side of the Koyukak river, Alaska. *C. katahdin*, on the upper surface, does not differ from *C. norna*. Below it is darker than *norna*, the band and strigulation more diffuse, approaching *semidea*, and with distinct submarginal dots as in the specimen of *taygete* shown. These so-called species seem to be forms of one true species, as the series from Alaska indicates. This series shows forms that may be referred to *fulla*, *taygete*, and *semidea*, yet they intergrade in a suspicious manner as if they were but variations of one type. *C. katahdin*, however, doubtless holds true to its own slightly divergent form in its circumscribed locality, and it is a matter of opinion whether it be referred to as an isolated local form or as a species. There seem in any case too many names for the American forms of Chionobas. *C. katahdin* is not the only form, collected from an isolated locality, that has received a name. The following table associates them in what may be a natural order. The last ten "species" are very poorly separated and may have to be ultimately united. The names of the species are following Skinner's recent catalogue which differ somewhat from those on Edwards' magnificent plates:

SYNOPTIC TABLE OF THE NORTH AMERICAN SPECIES OF CHIONOBAS.

By Harrison G. Dyar.

Large, sexes similar, wings broadly fulvous with only the veins and margins brown .... *macounii*
Large but the sexes dissimilar, the male with a distinct band of raised blackish scales across the disk of fore wings.
  Fulvous color bright, orange tinted.
    Hind wings fulvous over all the surface.
      Basal fuscous shade of primaries scarcely covering the sex mark; secondaries below contrastingly strigate in white and brown .... *nevadensis*
      Fuscous of primaries covering the sex mark in male; secondaries below mottled and with the usual median band .... *chryxus*
    Hind wings with the fulvous in a submarginal band........ ......*jutta*
  Fulvous color pale, ochraceous.......................... *ivallda*
Smaller, sexes similar, the male with none or but a slight sex mark.
  Secondaries below coarsely transversely strigose.
    No median band defined below.... .... *uhleri*
    A rather distinct median band as usual.................. ....*varuna*
  Secondaries below mottled, not conspicuously strigose.
    Median band of secondaries below defined, white edged, strigose mottled.
      Upper side strongly fulvous, veins contrasted............ { *tarpeia* / *alberta* }
      Upper side fulvous shaded, the male with a faint sex mark.
        Fulvous dark, orange tinted........................ { *norna* / *katahdin* }
        Fulvous pale, ochraceous............................ *dauria**
      Upper side without distinct fulvous shade.
        General color pale translucent gray brown.............. { *fulla* / *brucei* }
        More opaque umber brown .... *subhyalina*
        Dark brown, slightly fulvous .... *taygete*
        Darkly blackish.. *pertiæ*
    Median band diffused, obscure or obsolete.
      Gray brown or fulvous tinted............................ ......*œno*
      Whitish gray.. { *semidea* / *beanii* }

In this connection the subject of variation and geographical distribution was discussed by Mr. Schwarz and others.

Mr. Currie exhibited two specimens of the dragonfly *Sympe-*

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* Not seen.

trum rubicundulum (Say), collected by him on November 7 on the mainland opposite Plummer's Island, Maryland, between the canal and the river. Several specimens were seen, of which these were the only two captured. They were flying over, and in the neighborhood of, some small swampy pools fed by a spring, and one was observed to go through the motions of ovipositing. This seemed a rather late date for dragonflies to be flying in this locality.

Prof. Smith said he had found dragonflies of this species after the 15th of October, and after a frost, in the cranberry bogs of New Jersey. Mr. Sanderson said he had also found this species in Delaware late in October, and Dr. Howard mentioned having collected other species at Boise, Idaho, on the 21st and 25th of the same month.

—Dr. Dyar exhibited a lepidopterous larva, cocoon and moth, concerning which he read the following paper:

A LEPIDOPTEROUS LARVA ON A LEAF-HOPPER.

(*Epipyrops barberiana* n. sp.)

By HARRISON G. DYAR.

Mr. E. A. Schwarz has handed me a lepidopterous larva, cocoon and moth, of which species he found two examples at Las Vegas Hot Springs, New Mexico. One larva fell into his beating-net from pine (*Pinus ponderosa*), and the other was taken by Mr. H. S. Barber, attached to a leaf-hopper which Mr. Heidemann says is *Issus* species, near *auroreus* Uhler of the Fulgoridæ, occurring on the same tree. Mr. Barber states that the larva was firmly attached on the dorsal surface of the abdomen under the wings, and it required some force to remove it, but he did not observe any attaching membrane. Mr. Schwarz at first took it to be a species of Coccid allied to Dactylopius from its general appearance.

Prof. J. O. Westwood has published (Trans. Ent. Soc., Lond., 519, 1876) an account of a lepidopterous insect living on *Fulgora candelaria* at Hong Kong, China, from material collected by Mr. J. C. Bowring, and deposited in the British Museum. He named it *Epipyrops anomala*, new genus and species, and placed it in the Arctiidæ. The larva was stated to be covered with a cottony coat, causing it to resemble a Coccus. Later (Trans. Ent. Soc., Lond., 433, 1877), Prof. Westwood again referred to this insect, and cited instances of an analogous, if not identical, species (not bred) observed by Lieut-Col. Godwin Austen upon *Aphæna* species (Fulgoridæ) in the Dillrang Valley, and by Mr.

Wood-Mason upon *Eurybrachis spinosa* (also Fulgoridæ) from a specimen belonging to the Madras Museum. It was supposed that in all these cases the larvæ fed upon the waxy matter secreted by the Fulgorids. In the last instance, the larva was observed to be attached to its host by a white membranous band on the dorsal surface of the abdomen, but the exact nature of this band was not determined.

The genus Epipyrops, originally referred to the Arctiidæ, was placed in the Liparidæ by Kirby (Cat. Lep. Het., i, 490, 1892), and in the Limacodidæ by Sharp on the opinion of Hampson (Cambridge Nat. Hist., vi, 404, 1899). I know of no other published references.

Unfortunately Mr. Schwarz's single specimen is in very poor state, being both crippled and mouldy. The antennæ, however, are well preserved, and bear remarkably long pectinations. I was able to make out the venation by sacrificing the wings on one side. The forewings have vein 1 moderate, apparently simple, 1*c* present, strong outwardly; veins 2 to 3 evenly spaced, remote; 4 and 5 rather close together, 6 and 7 equally spaced, 8 and 9 more close together, arising from the longest part of the cell, 10 and 11 equally spaced, arising from the cell toward the end, 12 free from the base. Hind wings apparently with three internal veins, though this part of the wing is crumpled; vein 2 from the middle of the cell, 3 well separated, 4 and 5 close together but not so close as on the forewings; 6 and 7 well separated, the cell well rounded, its upper vein weak; vein 8 from the base, free; male frenulum a single sharp, tapering, straight spine. The head and legs are covered by hyphæ of mould, but appear to be as in Epipyrops, the palpi very small, the legs without perceptible spurs. Thus this insect agrees generically with Epipyrops as far as can be seen. A considerable portion of the wings has been denuded of scales. Those that are left are blackish, with pale tips, forming a grizzled gray, apparently uniformly over the wing; hind wing blackish brown. Expanse of wings about 8 mm. I propose to call the species *Epipyrops barberiana* in honor of Mr. H. S. Barber, who capably assisted Mr. Schwarz in his valuable explorations in Arizona and New Mexico, and who found this insect in its natural position.

The larva, preserved in alcohol, is nearly hemispherical, a little elliptical, flat along the ventral surface, very evenly arched dorsally. The head is rather large, retractile. Thoracic feet normal in number but very short and reduced, though perfectly visible. Abdominal feet represented by rather large, complete, ellipses of crochets on segments 4 to 6, and a more distinct, protruded pair of feet on the last segment. The segments are short, contracted, furnished with a considerable number of minute secondary hairs, the ordinary tubercles indistinguishable. Mr.

Schwarz states that in life the larva was covered by a white waxy secretion which is now dissolved by the alcohol. The secretion of the host has likewise disappeared, both in the alcoholic and the dry specimens, but Mr. Schwarz thinks that it was originally present. The color of the larva is destroyed by the alcohol, but it was an obscure whitish. All these characters agree with *Epipyrops anomala*.

As to the systematic position of this insect, I cannot agree with any published opinion. That of Sir George Hampson, referring it to the Limacodidæ is the most reasonable, but is negatived, among other characters, by the structure of vein 8 of the hind wings and by the abdominal feet of the larva. It is a Tineoid form, apparently not referable to the Tineidæ proper. Meyrick's tables seem to place it in the Zeuzeridæ, Hampson's in the Dalceridæ; but it will probably prove deserving of separate family rank.

[Dr. Howard has since called my attention to a note (Proc. Ent. Soc. Lond., p. xx, 1883) recording this genus from Central America, but the larvæ were apparently not bred. The note is by Mr. Champion and states that larvæ were not infrequently found attached to and feeding on the white cottony secretion so abundant about some of the smaller Fulgoridæ. As many as three larvæ had been seen attached to one imago. The Fulgoridæ were very sluggish in their habits.]

—Mr. Benton called attention to a particular in which, he had observed, the Cyprian variety of bees differ in their habits from native and Italian varieties. Instead of driving out and killing all drones at the end of the honey harvest, they kill about four-fifths of them and permit the others to go back into the hive, only gradually destroying these, and, in some instances, permitting a few to live over the entire winter, even in colonies normally supplied with queens.

Dr. Dyar then presented the following paper:

NOTES ON MOSQUITOES ON LONG ISLAND, NEW YORK.

By Harrison G. Dyar.

These observations were made at Bellport and Amagansett. The village of Bellport is on the south shore of Long Island, about the middle of the length of the island on Great South Bay. The land is flat and sandy, cut by sluggish streams forming lakes and pools. The bay is strongly brackish but without salt marshes in this vicinity. Mosquitoes were abundant in the season of 1901.

The woods and grass swarmed with *Culex sollicitans* and *C. cantans*, while Culex and Anopheles entered the house in some numbers in spite of screens. Larvæ were found in various situations, as will be described in detail in the following notes. No larvæ were seen, however, in any body of water large enough to be roughened by the wind, nor in any water so shaded by the woods as to be dark. Several suspicious looking pools hidden in the dark woods were barren of mosquito larvæ, though the adults swarmed there as they did almost everywhere else.

Anopheles crucians Wied.

This was the commonest Anopheles in the house, though not bred from collected larvæ. Several examples were taken in the act of biting.

Anopheles punctipennis Say.

Not common as adult, though the larvæ occurred in numbers with the following species in nearly equal proportion. Dr. Howard states in his publications on mosquitoes that the larva differs from that of *maculipennis*, "chiefly in the markings of the head." I was not able, however, to differentiate them by this or any other very definite character. The Anopheles larvæ occur in two forms, one with the back spotted with white, the other unspotted. These were separated, but gave both species in nearly equal proportion. A puddle formed by rain at the side of the road contained a pure colony of *punctipennis*, and these were almost entirely of the white spotted form. This particular colony was entirely killed by the drying of the puddle shortly after I had collected from it. A similar puddle near Washington, D. C., contained this species, unmixed.

Anopheles maculipennis Meig.

The larvæ occurred more or less commonly in nearly every pool and pond, and even in the blacksmith's rain-water barrel. A few could be found along the stagnant margins of swiftly flowing streams. *A. punctipennis* usually occurred mixed, in fact it was generally slightly the more abundant of the two. The Anopheles imagoes did not fly about the streams where their larvæ occurred, at least they did not attempt to bite, whereas swarms of Culex occurred in such localities, especially *C. sollicitans*, whose breeding places were miles away. The maculation of the Anopheles larva varies from none to a few dots or a complete band of white pigment down the back. This pigment is in the skin, and is often very white like porcelain. The larvæ seem darker as a rule than *punctipennis*, and the white spots, when present, are more contrasted. The heads seem to me to be practically identical.

Culex sollicitans Walk.

Abundant everywhere; the most common mosquito. They were very troublesome except at the actual breeding places, where they were scarcely more fierce than house flies. Apparently they are not prepared to bite immediately after emergence. The breeding places of this mosquito were not found till near the end of my stay, so that I had begun to think I should not find them at all. However a place was found at Amagansett where the species bred in swarms. The land behind the beach at this point is low and had been flooded at some time previously by high waves; subsequent rains had diluted this water. The swampy pool which it formed, full of grass, was examined on September 16th. It was at that time scarcely perceptibly brackish to the taste. It contained many pupæ and a few well-grown larvæ; no young ones. The grass in and about the pool fairly swarmed with freshly emerged *sollicitans*. A heavy rain had occurred the previous day so that the pool was evidently more diluted than it had been and it was too fresh for normal breeding. Of the examples carried home those at first emerging were all *sollicitans*, but the later ones were *cantans*. I did not at this time differentiate the larvæ of these species. They must be very similar. The adult must fly considerable distances. It was noted at Yaphank, which is three miles from the bay and over six miles from the ocean. It was only somewhat less common than *cantans* at that place, and I should judge it capable of reaching the middle of the island (15 miles). Since writing the preceding remarks, Prof. J. B. Smith has loaned me some larvæ that he is sure are *sollicitans*. They are indeed very similar to my *cantans*. The hairs are a little shorter, the air tube also shorter, being scarcely more than twice as long as wide, and the lateral comb of the eighth abdominal segment consists of fewer, slightly more irregularly shaped spines; but the characters are so slight that I am doubtful if they can be used in practical differentiation.

Culex cantans Meigen.

Nearly as common as the preceding, and more troublesome and persistent in the woods, though less common in the house. The larvæ breed in fresh-water swamps formed by rain in low lying, grassy places. A low place near the beach at Bellport, located much as the one at Amagansett above referred to, but lying behind a higher bar of sand, was not reached by the high waves. It was dry on August 27th but was filled with fresh water by subsequent rains. On September 13th it contained many larvæ in various stages of development, some of which pupated the following day. They emerged mostly *cantans*, though one

example of *sollicitans* came out with the white ring on the proboscis very small and a larva of *territans* was seen with the others. The larvæ fed on the flocculent brown sediment at the bottom of the pool. Some transferred to jars converted all of the sediment included with them into pellets of frass in a few days. A fresh-water Hydroid occurred in the same pool and proved a serious enemy to the mosquitoes. A single example fastened itself to the side of the glass and devoured all of the larvæ but one before it was noticed what was going on. It caught the larvæ with its tentacles and digested them bodily. Some of the larvæ were nearly covered with a little stalked Protozoon (Vorticella), but it seemed to do them no obvious harm.

Culex tæniorhynchus Wied.

Not common, though several were taken, both out of doors and in the house. The larva was not met with.

Culex pipiens Linn.

This species, bred commonly in every rain-water barrel, bucket, or old tin can in the town, and apparently nowhere else. The larva was not seen in any of the natural bodies of water. The fly entered the house to some extent, but was not much trouble out of doors, except on the porch, and even there *sollicitans* was the more persistent. The larvæ feed upon bacteria. A dish of water which was turbid and foully smelling was quickly cleared and all odor destroyed by these larvæ. Some were introduced into water from which a number of *cantans* larvæ had just been removed, intending them as food for the Hydroid; but they all died in a few hours without any obvious reason. Apparently they cannot live in water fit for *cantans*, which lived in this same water for weeks afterward. There seems no reason to doubt but that this species is really the European *C. pipiens* Linn.

Culex territans Walk.

This was identified for me by Mr. Coquillett, as were all the species. It was previously known to him only by Walker's description, and there seem to have been no specimens in American collections. The fly was not common, and looks very much like *pipiens*, so that it would have been hard to identify it in the field. The larvæ prefer cold water. A cold spring, forming a pool about 20 feet in diameter, contained numbers of these larvæ, with a few Anopheles; a rather cold lake formed by a dam in a small stream overhung by trees contained some larvæ with an abundance of Anopheles and a very few Uranotænia. They were not found in a warm, scummy pool, which yielded the other species freely. The larva is distinct from the other Culex here noted by the peculiarly colored antennæ, white in the middle and blackish at the base and tip.

The larvæ of the above four species of Culex resemble each other in general structure. They differ in several minor characters. *Pipiens* and *territans* agree in having a long, slender breathing tube, that of *territans* being especially long, and in the position of the antennal tuft, well developed at the outer third of the joint. They differ in the broad head of *territans* with the antennæ distinctly banded with white and the narrower head of *pipiens* with pale luteous or infuscated, unbanded antennæ. *Sollicitans* and *cantans* agree in the shorter conical or fusiform breathing tube, the antennæ blackish at the outer half, with the tuft at the middle of the joint, often weak or invisible. They do not sensibly differ; certainly not in any readily appreciable character that I have been able to find. All the larvæ from the Amagansett marsh had very short anal finger-shaped processes, while those from Bellport had them moderately long, but both colonies were mixed. Anyway, the length of the anal fingers is not a specific character.

The habits appear to be correctly expressed as follows:

Living in cold springs or lakes.. *territans.*
Living in small confined bodies of rain water.................... *pipiens.*
Living in fresh water grassy marshes .... *cantans.*
Living in salt water grassy marshes.................................... *sollicitans.*

Uranotænia sapphirina O.-S.

The larvæ occurred rather commonly in a warm pool filled with green algæ (Spirogyra) along with Anopheles. A few were found in the cold lake, as above noted. The little larvæ remain mostly at the surface, not being easily disturbed. They float flatly, though below the surface film, and were several times mistaken for the Anopheles with which they occurred. The head is elongate and blackish brown, the hairs of the first two abdominal segments are long, the rest short and stellate. Altogether the larva presents a good generic type, quite distinct from both Culex and Anopheles. The little adults caused no trouble and were not seen flying. I give a more complete description of this form in another place. (Jour. N. Y. Ent. Soc., ix, 179, 1902.)

Prof. Smith records this species as having been bred from the pitcher plant (Ent. News. xii, 189, 1901), but he informs me by letter that the published statement is an error and that he has not bred *sapphirina*.

I exhibit, for comparison with the foregoing, drawings of *Psorophora ciliata* Fab., made from Dr. Howard's specimens which were loaned to me by Mr. Kotinsky, *Aëdes smithii* Coq., from pitcher plant larvæ obligingly sent to me by Prof. Smith, after whom the species was named, *Stegomyia fasciata* Fab., from larvæ which I owe to the kindness of Dr. W. C. Reed, of the Army Medical Museum, and *Culex confinis* Lynch, which I

collected near Washington, D. C. Prof. Smith has also let me see larvæ of *Culex canadensis* Theobald, which I cannot distinguish from *C. cantans* very sharply. The air tube is a little longer and slenderer, and the anal fingers are longer than the segment, but these characters seem varietal rather than specific.

These drawings cover all the mosquito larvæ known at the time of writing. It appears from Dr. Howard's book that *Culex impiger* had been bred; but I learn from Mr. Coquillett that this is an error, and that the flies bred by Mr. Pratt as there described (page 79) really belong to *C. pipiens*. I have myself examined Mr. Pratt's flies and agree with Mr. Coquillett.

Finally, I show a drawing of a very curious larva without mouth brush, the antennæ jointed on the upper surface of the head instead of on the sides, and a lateral fringe on the widest part of the head. The last thoracic segment and first two abdominal ones bear lateral conical prolongations. The air tube is short, uniform; anal segment with four short, often invisible, fingers, a paired dorsal and single ventral tuft; no lateral comb on the eighth abdominal segment. Hairs of last thoracic and first two abdominal segments long, the rest shorter, but those of the eighth abdominal segment longer than the preceding ones.

Mr. Coquillett has named this species *Corethra brakeleyi* (Ent. News, xiii, 85, 1902).

The following table presents the differences between our mosquito larvæ in synoptic form. I have not included Corethra or Mochlonyx, genera belonging to the Culicidæ, as the adults have no proboscis and are, therefore, not "mosquitoes." *Mochlonyx culiciformis* is roughly figured by DeGeer without mouth brush, and with the curious bent antennæ arising from the side of the head, not from the upper surface, as in our Corethra. The larva is said to float horizontally in the water, but it has a distinct breathing tube, not sessile as in Anopheles.

Mouth hairs diffusely tufted, folded inward in retraction.
  Air tube short, sessile; larvæ floating at the surface of water.
    Eyes longitudinal.
      Abdominal hairs unequal; ventral brush normal, large.
        Body paler, the head contrasting darker... *Anopheles punctipennis.*
        Body darker, the head not contrasting..... *Anopheles maculipennis.*
  Air tube longer than wide; larvæ floating below the surface of water.
    Eyes transverse.
      Air tube elongate, four times as long as wide.
        Lateral comb of eighth abdominal segment a patch of simple spines.
          Antennæ with tuft beyond middle of joint, large.
            Head square; air tube very long................ *Culex territans.*
            Head rounded; air tube moderate .... *Culex pipiens.*
      Air tube short, less than four times as long as wide.
        Anal processes slender or reduced.
          Lateral comb a patch of simple spines.......... *Culex canadensis.*
            Culex cantans.
            Culex sollicitans.
          Lateral comb a row of few large spines, with toothed basal plates .... *Culex confinis.*
        Anal processes dilated.
          Lateral comb a row of several spines, with elongate basal plates.. .. .. *Stegomyia fasciata.*
    Eyes rounded or longitudinal.
      Abdominal hairs equal, ventral brush absent.
        Anal processes dilated (2); head without conspicuous hairs...... .... *Aëdes smithii.*
      Abdominal hairs unequal; ventral brush normal.
        Anal processes slender, normal (4); head with four large coarse black hairs....... *Uranotænia sapphirina.*
Mouth hairs in a pair of remote pencils, folded outward, in retraction.
  Eyes longitudinal; air tube longer than wide.
    Anal processes very long, tapering at tip; ventral brush present .... *Psorophora ciliata.*

This communication occasioned much interest and was discussed at length by several of the members and others present. Mr. Kotinsky said he had reared larvæ of *Anopheles punctipennis* from pools on Mount Pleasant, D. C. Some of the larvæ were of a greenish color. Prof. Smith said that, in his experience, Anopheles bred everywhere. *A. punctipennis* was the common species in New Jersey. *A. maculipennis* was much less common

and usually found mixed with *punctipennis*. He had found only one place where it occurred by itself. He also noted that some were green and that they varied all the way from this color to black. Green larvæ were usually found in marshes where there was a good deal of surface vegetation or where the larvæ were above the surface of submerged leaves. He also found it, in one place, in brackish water, this being the only record of this kind in the United States, though it has been reported breeding in saltish water in Europe. *Culex pipiens* larvæ, he said, when full grown, will stay under ice as long as eight hours without a chance of coming to the surface. *C. canadensis* is a woodland species found in cold springs. *C. sollicitans* is the commonest species in Southern New Jersey, and the only one observed in some localities. This species is sometimes carried a distance of at least forty miles from its breeding places. *Aëdes smithii*, he thought, did not bite in New Jersey, though Dr. Howard said that the gentleman who collected it in Florida reported its biting badly. It lays its eggs in the leaves of the pitcher plant as they are just opening and when no water has yet been deposited.

Dr. Howard congratulated Dr. Dyar upon his contribution to the life-history of the mosquitoes. He was much interested in the larval differences shown, especially as between the various species of Culex. He alluded to the immense increase in the knowledge of these insects which had recently been gained, and the many important discoveries made during the past few months especially, many of them since the publication of his book on mosquitoes. He spoke of the important generic differences in the mouth-parts; these were not mentioned by Dr. Dyar, but he thought they would prove useful in a table. Dr. Fernald gave an account of his experience with Corethra larvæ. Many hydras were found in the jars where he had them breeding. They seemed to momentarily paralyze the larvæ.

As too short a time remained for the other papers to be read before the hour for adjournment, it was voted that Prof. Smith be invited to continue his remarks on the subject of mosquitoes. Doing so he explained how he knew that *C. sollicitans* is carried a distance of forty miles. Their appearance at certain places away from the salt water is dependent upon the direction of the wind, and the species has been found at least forty miles from its nearest breed-

ing place. Its eggs and first larval stage were unknown to him. He said, further, that *sollicitans* would breed in water 25 per cent. more salt than the sea itself. Contrary to Dr. Dyar's observations, he had found *C. pipiens* breeding in almost all kinds of watered places except cold springs. In large bodies of water, agitated by the wind, mosquitoes did not breed except near shore where the water was smooth, yet here he had found them commonly.

DECEMBER 5, 1901.

The 164th regular meeting was held at the residence of Dr. C. W. Stiles, 1718 Q street, N.W., President Dyar in the chair. There were also present Messrs. Patton, Simpson, Barber, Quaintance, Caudell, Schwarz, Kotinsky, Gill, Howard, Busck, Ashmead, Doolittle, Morris, Matthis, Benton, Currie, Stiles, and Richardson, members, and Mr. Martin visitor.

The annual election of officers being then in order, the present officers were re-elected for the year 1902. The Society then voted that the chair appoint a new publication committee, as has been the custom for each new volume of the "Proceedings." Dr. Dyar then appointed Messrs. Currie, Schwarz, Howard, and Ashmead to act with him on this committee.

Under the heading Short Notes and Exhibition of Specimens, Mr. Kotinsky exhibited a large series of the Reduviid bug *Milyas cinctus* Fabr., collected by him near Washington under the bark of the plane tree *Platanus* on November 10. They were grouped in large, compact clusters, the largest of these containing at least twenty-five specimens. Mr. Schwarz remarked that he had also found this insect, as well as a species of *Tingis* and the beetle, *Xylophilus brunnipennis* Lec., grouped in a similar manner under the bark of this tree during the winter.

—Mr. Ashmead mentioned that Prof. Wheeler, in a recent number of the "American Naturalist," recorded the fact that workers in the genus *Pheidole* are parasitized by a worm belonging to the genus *Mermis*. This greatly increases the size of the worker and causes it to bear some resemblance to the female. Wheeler proposed the term *Macroergates* for this form of parasitism.

—Then followed the paper by Dr. Howard, entitled "An Outline Sketch of a Long Trip." On the 17th of August last he had, with Mr. Clifton, left Washington for Denver, Colorado, to attend the meeting of the American Association for the Advancement of Science. Among the organizations which met there was the Association of Economic Entomologists. Their meeting was very interesting, and one of the principal features was the paper by Mr. Marlatt on "The Original Home of the San José Scale." Mr. Marlatt gave it as his opinion, founded largely upon his researches in Japan, that there is nothing to show that the San José Scale is indigenous to that country. This view was combatted by several of the entomologists in attendance at that meeting. A thorough exploration of Japan, made by Mr. Marlatt since that time, established the correctness of his assertion which was, moreover, conclusively settled by his discovery of what is undoubtedly the true home of this pest in the northern part of China. Here it lives on native food-plants and is held in check by its natural insect enemies.

About the first of September, Dr. Howard left Denver for Houston, Texas, where he met Mr. Hunter, and with him spent some time in that State investigating the Cotton-boll Weevil. The mesquite was first seen by him near Fort Worth. A trip was made to Austin to see Prof. Wheeler, who has been making such valuable contributions to the life-history and habits of the ants. Prof. Wheeler, however, was absent from there at that time and he did not see him.

At San Antonio he took the Mexico National Railroad direct to Mexico City, where he intended to consult with Prof. Herrera, Entomologist of the Mexican Government, concerning the Morellos Orange Fruit Worm. An interesting account was given of the country through which the railroad passed, especially that between Laredo and the city of Mexico. The occurrence of tree yuccas, mesquite, and giant cactus was mentioned in particular.

After leaving Mexico City, where he found Prof. Herrera and spent some time with him, he took the Mexico Southern Railroad for Puebla and Oaxaca. Other characteristic plants were seen on this part of the journey, among them the century plant and cacti of various species, notably the magnificent organ cactus and the very large Opuntias. Most of the farm hands and labor-

ers in this section are Indians. Oaxaca he found to be a very interesting city with some curious remnants of an old civilization, among which were the rude ox carts commonly used there. The Indians thereabouts are only partially civilized and are bad characters, often committing robbery in the surrounding country; collecting is, therefore, attended with danger. Through the kindness of a policeman, who pointed his revolver in a threatening manner at some of the Indians to keep them quiet and in position, he was enabled to secure photographs of them. Fleas were extremely abundant in this country as he discovered to his cost.

Owing to the almost incessant rains occurring in Mexico at that time of year (September) collecting was difficult. Among the insects obtained were a new species of *Bombus*, a Fulgorid (*Acræphia*) pronounced new (the egg masses of which were also collected), and an interesting and widely distributed earwig of good size, *Sphingolabis tæniata* Dohrn. An egg-mass of a katydid (*Microcentrum* species), given him by Prof. Herrera, differed from those found in this country in that the eggs were laid almost perpendicularly to the surface of the leaf, instead of horizontally. In Oaxaca he found one entomologist who had quite a collection, and the Oaxaca Museum also contained a collection, which was, however, in very bad condition.

Returning to Mexico City, he proceeded from there to El Paso, Texas, this time taking the Mexico Central Railroad. The country along this route is very similar to that on the Mexico National. From El Paso he went to Los Angeles, California, where he met Dr. A. Fenyes, Mr. H. C. Fall, and Mr. F. Grinnell, Jr. The mother of the latter gentleman was much interested in natural history objects, and among other things she had a living colony of the very poisonous spider *Lathrodectus mactans* as pets. On being told of the dangerous character of her pets she resolved after some hesitation, to have them killed.

From Los Angeles he proceeded to Fresno. In the latter place he found the Smyrna figs well established, and a large crop had been gathered. San Francisco was the next point visited; one of the most interesting things, in his opinion, found here is the beautiful little island of Belvidere in San Francisco Bay, with its unique and picturesque dwellings. Portland, Oregon; Seattle, Washington, and Moscow, Idaho, were then visited in turn. At

the latter place he met the entomologist, Prof. J. M. Aldrich, and was favorably impressed with his work. Boise City was stopped at briefly, and from there he passed through Wyoming and returned home. Dr. Howard's account of his trip was illustrated by many photographs taken *en route* of objects and places of interest.

At the conclusion, questions were asked and discussion participated in by Messrs. Doolittle, Gill, Kotinsky, Stiles, and Schwarz. Mr. Schwarz, speaking of the *Chilocorus* which preys upon the San José scale, said that *C. similis*, the form found in North China, was extremely like our *C. bivulnerus*, in fact, almost indistinguishable, and more especially like the race of *bivulnerus* occurring in California. He recalled how *C. bivulnerus*, originally found on oak in Florida, transferred itself to the orange when orange culture began to become general in the central part of the peninsula. The beetle increased enormously, and aided very materially in keeping the scale in check. It was also said that the reason it was not of more benefit in more northern localities was because of its being a slow breeder.

—The next paper was by Dr. Dyar, and was entitled:

ILLUSTRATIONS OF THE EARLY STAGES OF SOME DIPTERA.

(Plate I.)

By Harrison G. Dyar.

While looking for mosquito larvæ at Bellport, N. Y., the larvæ or pupæ of several other water inhabiting flies were noticed, some of which were bred. Mr. Coquillett has kindly named them for me.

Tanypus dyari Coq. (Fig. 8.)

Only the pupæ were noticed. They occurred in the cold spring pool with *Culex territans*, and greatly resemble mosquito pupæ. On comparing the figures it will be noted that they differ in many proportions from Culex, but when taken in the water the general resemblance was deceptive. They were, however, much larger than the Culex. They have the same habits, resting at the surface with the slender funnel-shaped, prothoracic air tubes penetrating the surface film and quickly descend when disturbed. The anal paddles resemble those of Culex, but are more hairy.

Sepedon fuscipennis Loew. (Figs. 6 and 7.)

These disgusting black maggots were not infrequent in the collection of dead plants, scum and floating matter at the dam in the cold lake and in the adjoining water. They rest and move below the surface, parallel to it, suspended by the four radiate, narrow plates with which the body terminates. These rest with the upper surface dry, and expose the spiracles to the air. The larval segments are distinctly 3-annulate, the color is blackish with waved black lines showing by transparency. The puparium floats in the water, resembling a seed. It is blackish above, whitish on the sides, with a lateral reddish stripe containing segmentary black dots; below whitish gray, speckled with black dots.*

Chironomus anonymus Will.

These larvæ were first noticed in the blacksmith's rain-water barrel. They are bright red in color, but usually remain in a tube formed of granular sediment united together. The material seems to be largely the excrement of mosquito larvæ. They wriggle with a slow squirming motion continuously, apparently to aërate the tracheal filaments. The pupa also remains in the case, but wriggles with a different motion as it has to aërate the bunches of fine filaments on the prothorax. Shortly before the emergence of the imago it rises to the surface.

Larva (Fig. 1). Head a little higher than wide, flattened, rounded, oblique; clypeus large, triangular, high; eyes in two small, angular patches; antennæ moderate, simple; labium distinct with two simple hairs; a few hairs on the surface of the head. Body slender, elongate, last two thoracic joints gently enlarged, subconsolidated. On ventral side of prothorax anteriorly a short bilobed process bearing a large tuft of slightly curved spines; between the 7th and 8th abdominal segments ventrally a group of long, thick, curving, subsegmented respiratory tubes; a tuft of four small processes on the last segment; a group of hairs at the dorsal tip; anal tip conical, with a ring of curved spines. Color bright coral red, translucent; alimentary canal whitish, more opaque.

Pupa (Fig. 2). Head nearly free; thorax small, the wing cases partly covering the long, coiled leg cases. A diffuse bunch of finely branching respiratory filaments on prothorax. Abdomen long, tapering, gently curved.

Chironomus modestus Say.

These larvæ occurred in cases similar to the preceding, but they lived in the masses of Spirogyra and under the Lemna leaves in the lake. They were much smaller and slenderer than the other species and pale whitish in color. The larva is without the

*This has just been figured by Needham & Betten, Bull. 47, N. Y. State Mus., pl. 14, ff. 1–5, 1901.

branchial filaments; it wriggles in a similar manner, however. Probably its small size renders it possible to aërate the tissues completely through the skin.

Larva (Fig 3). Head rounded, flattened, free but somewhat retracted; antennæ slender, distinct; eyes of two contiguous black spots. Body slender, filamentous, undulatory. A ventral pad on the prothorax bearing a tuft of recurved spines. Four anal finger-shaped processes and a dorsal, terminal, double tuft of hairs. Whitish, translucent, alimentary canal more opaque or blackish, according to food.

Pupa (Fig. 4). Shaped as in the preceding species, the cases forming a moderate prominence. Abdomen slender, tapering, ending in a ventral lamellate projection, the last segment bearing a large tuft of colorless hairs. Translucent, pale greenish, the thorax yellowish, eye dark; wing and leg cases very transparent. A tuft of few, rather coarse, filaments on the prothorax.

Ceratopogon varicolor Coq. (Fig. 5.)

The pupa only was observed. It was floating upright with the air tubes penetrating the surface. The abdomen was straightly extended so that the stiff, spiny thing did not suggest the appearance of a mosquito pupa at all.

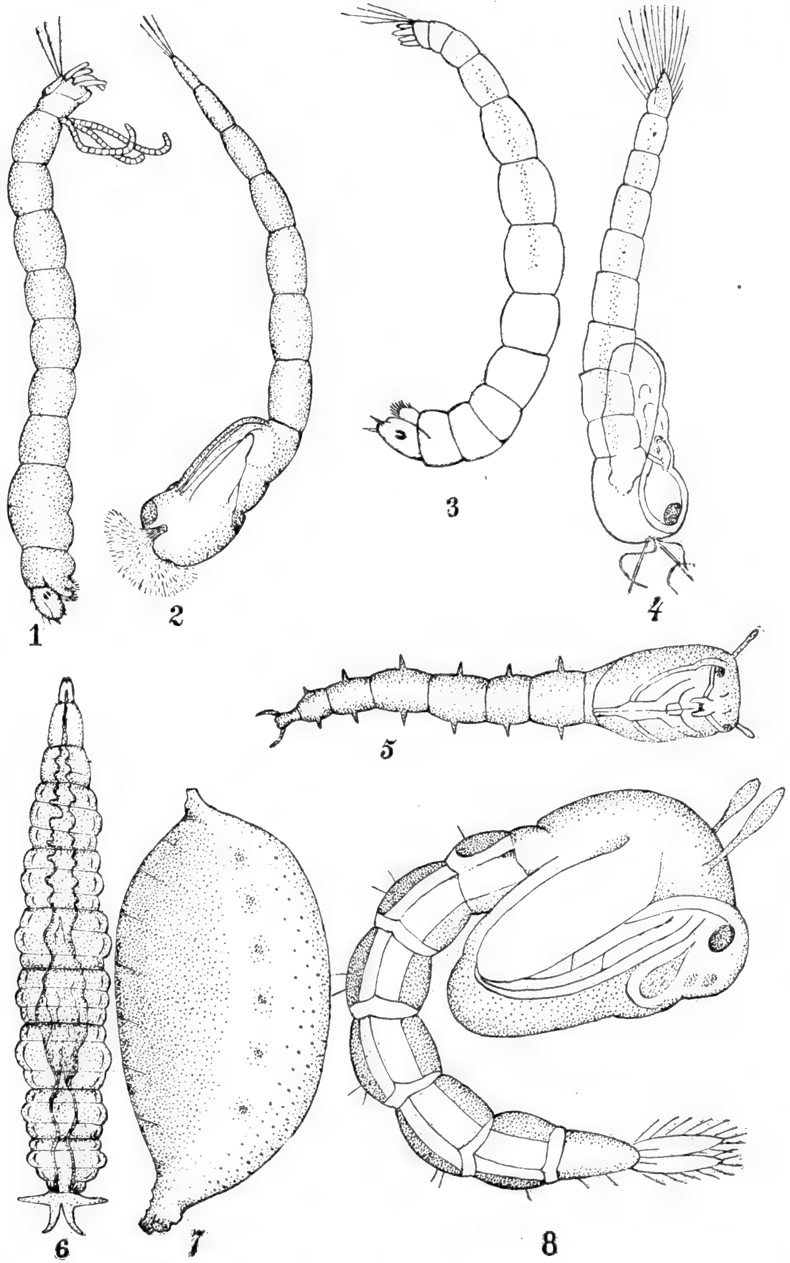

PLATE I.

FIG. 1. *Chironomus anonymus*, larva. 2. Pupa of the same. 3. *Chironomus modestus*, larva. 4. Pupa of the same. 5. *Ceratopogon varicolor*, pupa. 6. *Sepedon fuscipennis*, larva. 7. Pupa of the same. 8. *Tanypus dyari*, pupa.

The paper was discussed by Messrs. Ashmead, Howard, Stiles, and Gill. Dr. Howard mentioned the interesting observation, recorded by Mr. S. I. Smith, of New Haven, Connecticut, that Chironomus larvæ had been found in Lake Superior at a depth of 600 feet below the surface of the water. Dr. Packard, Dr. Howard continued, had found larvæ of some species of *Chironomus* in salt water in Salem Bay. Dr. Howard noted further that *Anopheles punctipennis* had been found breeding in brackish water at the head of Chesapeake Bay. On his late trip he had found the burning of pyrethrum powder in his room very effective against mosquitoes. *Culex pipiens* was the only mosquito met with in Mexico, and this species, according to Prof. Herrera, was probably introduced thither from the lower Rio Grande Valley, Texas, at the time of the opening up of the Mexico Central Railroad.

The concluding paper was by Dr. Stiles, entitled:

THE CATTLE TICKS OF NORTH AMERICA.

By Ch. Wardell Stiles.

(*Author's Abstract.*)

Doctor Stiles presented before the Society the final proof sheets, with illustrations, of an article entitled the "Cattle Ticks (Ixodoidea) of North America," prepared by Doctor Salmon and himself for publication in the Annual Report of the Bureau of Animal Industry. He discussed the various species briefly; noting several changes in the designation of some of the parasites in question. Contrary to the views of Europeans, he is inclined to recognize *Boophilus* as distinct from *Rhipicephalus*, and he called attention to the necessity of accepting the genus *Boophilus* as basis of quarantine hereafter against Texas fever, instead of the species *Boophilus bovis*. He brought out the interesting fact that the *Boophilus* of Cuba is distinct from the form which occurs in the United States, and apparently agrees with the species found in Australia. Heretofore there has been considerable difficulty in distinguishing between *Dermacentor reticulatus* and *Dermacentor electus*, better known as *Dermacentor americanus*. He stated that *Dermacentor electus* has nothing whatever to do with the original *Acarus americanus*, which is evidently *Amblyomma unipunctatum*, and that it may be easily distinguished from *Dermacentor reticulatus* by the difference in the structure of the stigmata. In *Dermacentor reticulatus* the

stigmal plates are very coarsely punctate, while in *Dermacentor electus* they are very finely punctate.

The paper contains analytical keys to all of the known species of ticks.

The paper was discussed by Messrs. Schwarz, Ashmead, Howard, and Gill. Dr. Stiles also mentioned the curious resting stage of the ear tick *Ornithodoros megnini*, with figures illustrating it. It had, he said, once been described by an entomologist as an egg. Dr. Howard said that it resembled exactly the hypopus stage of Tyroglyphid mites.

JANUARY 9, 1902.

The 165th regular meeting was held at the residence of Dr. H. G. Dyar, 1512 Twenty-first street N.W. The President, Dr. Dyar, occupied the chair, and there were also present Messrs. Simpson, Benton, Patten, Morris, Ashmead, Mann, Pollard, Hay, Barber, Caudell, Hunter, Kotinsky, Gill and Currie. Dr. Dyar was elected Vice-President of the Washington Academy of Sciences for the Entomological Society of Washington.

President Dyar then delivered his annual address, as follows:

ANNUAL ADDRESS OF THE PRESIDENT.

THE COLLECTION OF LEPIDOPTERA IN THE NATIONAL MUSEUM.

By HARRISON G. DYAR.

I would ask your attention to the collection of Lepidoptera in the United States National Museum. It has been frequently pointed out in the annual reports of the Smithsonian Institution that it was eminently desirable that the United States Government should possess as complete a scientific collection as could be made, worthy of this large and prosperous country. Not insignificant in such a collection would come the insects, both from their relative abundance in species and the great economic importance of many of them. The order Lepidoptera forms a considerable part of the aggregate, and to the history and present

condition of the Governmental collection of this attractive order I would briefly invite your attention.

Before 1876, when the National Museum came into existence as a sequel of the Centennial Exposition at Philadelphia, the Smithsonian Institution was the depository of collections belonging to the Government. But it never amassed a collection of insects, nor had an entomologist on its staff. In the early years, when Townend Glover was acting as entomologist for the U. S. Government, some material was collected, and there came in from the surveys for a a Pacific railroad, the Geological and Geographical Surveys and miscellaneous sources, sundry insects. This material became subsequently entirely dissipated. Some of it was reported upon in Government publications by Stretch, Packard, Strecker, Grote and others, but the majority of the material seems to have remained in the private collections of those so reporting. Certainly all that is at present left of the Lepidoptera in the Government's. possession are a few specimens returned at a recent date by Dr. A. S. Packard.

In 1882 a department of insects was organized in the National Museum with Dr. C. V. Riley as honorary curator, without any assistance. The number of insects of all orders was estimated at 1,000, of which, perhaps, 200 may have been Lepidoptera, a most insignificant figure. More specimens than this could be taken by an active collector in a single day. We may well consider that at this date the national collection of Lepidoptera first began.

The first collection of any importance received was that of Dr. Riley. It was formally presented in 1885. It contained 17,000 specimens of Lepidoptera, besides 3,000 larvæ in alcohol and a few inflated larvæ. All the material was North American, with the most trifling exceptions, and principally amassed by Riley himself from the Southern States.

In 1886 Dr. J. B. Smith was appointed assistant curator. He brought with him his private collection, which was acquired by the National Museum by purchase. It contained a general collection of North American Lepidoptera most full in the family Noctuidæ, Dr. Smith's specialty. I find no exact record of the number of specimens in the collection, though it probably approached 15,000, and included the material of Mr. Meske, mostly collected about Albany, N. Y. During this time various smaller accessions

were being received, principally through the Division of Entomology of the Department of Agriculture, which has always been a steady, though never a copious, contributor to the collection. In 1886 the number of insects was estimated at 500,000. If one-fifth of these were Lepidoptera, the collection may have contained 100,000 specimens, including duplicates, at this date, and may be considered to have become fairly started, in charge of a Lepidopterist, under the direction of the entomologist to the Department of Agriculture, with apparently the most favorable auspices. The geographical range covered was, however, strictly North American, excluding Mexico.

An arrangement of the collection was begun by Smith and finished by Linell, who succeeded him in 1889, as far as the Microlepidoptera; but with the increase in the total number of insects in the collection, which kept up at the rate of 15,000 specimens a year, without any concomitant increase in the museum force, less and less attention proportionately was paid to the Lepidoptera. Linell was not a Lepidopterist, and, without assistance, could not be expected to do more than preserve the material from destruction. Consequently the collection fell into a state of virtual neglect.

In 1891 material began to be received from Dr. W. L. Abbott from Africa and Asia, and in 1892 the collection of G. Beyer, of New York, was received, 1,900 specimens, containing a series of European species. These were the first accessions of exotic material of any importance, and formed the nucleus of an exotic collection. It was not, however, arranged at this time.

There followed shortly the large collection of Japanese Lepidoptera through Prof. Mitsukuri, which had been on exhibition at the World's Fair at Chicago, further material from Dr. Abbott, and the collection of Mr. William Astor Chanler in East Africa, all of which remained stored in boxes and cupboards from lack of space to arrange it and of time by the single aid, Mr. Linell.

In 1895 Dr. Riley died and was succeeded by Dr. L. O. Howard as honorary curator. Dr. Howard had a lively interest in the national collection, and a reorganization of the Museum staff was effected,* whereby Messrs. Ashmead, Coquillett, Schwarz, and Currie were assigned to duty in connection with the insect collec-

* Noticed in Can. Ent., xxvii, 334, 1895.

tions. None of them had, however, any direct duty in connection with the Lepidoptera, which remained with Mr. Linell as a side issue. The collection gradually relatively declined till it was surpassed by that of many a private collector. Still the number of specimens continued to gradually increase. From the 100,000 in 1886 it rose to about 117,000 in 1887, 119,000 in 1888, and 120,000 in 1889; but in 1894 the estimate is only a trifle over 121,000. The effects of the unavoidable deterioration and waste had begun to be felt, and were scarcely overbalanced by the accessions. During his administration, Dr. Smith had prepared an exhibition series of some extent with much care. This suffered the ultimate fate of all material exposed to the light, and so much of the Government's material disappeared. Other specimens were rendered worthless through sending them to the Tennessee Centennial Exposition in 1897. Besides, over half the number of specimens in the collection had all along consisted of duplicates, and some of these were naturally gradually disposed of.

Mr. Linell died in 1897, and the same year the writer was appointed custodian of the Lepidoptera. The collection was found in general well preserved, though many duplicates were seriously infested with museum pests and had to be thrown away. In number of specimens the aggregate probably did not greatly exceed that of 1894. For a while the custodian worked alone, but later Mr. A. N. Caudell was assigned to assist during afternoons. A separate room was provided by the Museum authorities for the collection of Lepidoptera, and a complete rearrangement was begun.

Very considerable accessions of material now began to come in. American collectors became aware that a Lepidopterist was again in charge and they could give scope to their natural patriotic desires to see the national collection increased with the expectation that their donations would be received with interest and promptly labeled and arranged. The custodian brought a collection of 15,000 specimens containing both native and exotic material with many inflated larvæ and an amount of alcoholic material. This latter we have never counted, for the reason that it is practically a dead loss. Larvæ in fluid soon become unrecognizable from shrinking, hardening and discoloration; the material is awkward to handle, dangerous to the collection from ac-

cidental loosening of the bottles, and troublesome to keep in order. All of the old Riley material, as well as the great number of bottles filled from time to time at the Department of Agriculture are likewise nearly useless. We have lately concentrated our efforts on preparing inflated larvæ, which, though more trouble to make at first, give ultimate satisfaction. Even for small larvæ this method is preferable and we intend to completely substitute it for the placing of specimens in any kind of fluid. Doubtless some alcoholic material must be received from uninstructed or hurried correspondents, and even from some others whose conservatism, or possibly a different experience, leads them to prefer this method of preservation.

In 1900, Dr. Ottmar Hofmann, of Regensburg, Germany, died. His collection consisted of two parts, his own material and a portion of the collection of Anton Schmid. Schmid had recently died, leaving his "Macros" to Mr. E. Frank, and his "Micros" to Dr. Hofmann. The Hofmann collection proper was picked over by Lord Walsingham, who took away what he wanted in his special families. But the remainder and the Schmid "Micros," intact, came to the United States National Museum through the offices of Prof. A. R. Grote. Prof. Grote obtained the collection for us at a low price, and it was so purchased by the Museum. Thus was obtained a very full collection covering the European fauna. The families which Lord Walsingham had taken from the Hofmann material were duplicated from the Schmid collection, with the exception of one family, the Psychidæ. These were formerly classified as "Macros," so Schmid's specimens did not go to Hofmann. On the other hand, Lord Walsingham took Hofmann's Psychidæ as they are now referred to the "Micros," his own special group. But, with this exception, the National Museum obtained by this very inexpensive purchase an admirable representation of the European Lepidoptera throughout, the smaller Tineids being as fully represented and as carefully mounted as the large butterflies. The collection numbered over 15,000 specimens. The sendings of Dr. W. L. Abbott continued, his last being from Lower Siam, comprising several thousand butterflies and moths of that region. These were gradually mounted and placed in their proper families. A large part of the butterflies were named, with the assistance of

the late Dr. Herman Strecker, but most of the moths yet await identification. Several thousand South American moths of the commoner species were given to the custodian by Mr. Wm. Schaus, and have been distributed, but not fully named. The collection, as a whole, has been arranged, the duplicates separated and all the named species catalogued by means of a card catalogue by specific names. The collection has the largest room of any of the orders of insects, and is the first one to be completely installed in the regular Museum drawers; thanks to the interest and help of the assistant curator, Mr. W. H. Ashmead. It is as well housed as can be expected in the present Museum building.

In the summer of 1901 I made an arrangement with Mr. Wm. Schaus whereby his large collection of American butterflies came into my possession and was placed on deposit in the Museum, with the intention of ultimately donating it. It contains 10,000 specimens and fills nearly 200 drawers. The butterflies of both North and South America are very fully represented, and it contains the types of 200 species described by Mr. Schaus, with those of a few described by Mr. Godman in the Biologia Centrali-Americana.

Thus at the end of the year 1901 the National collection of Lepidoptera at last begins to show respectable proportions. There are now 99,500 specimens representing 12,150 species, with about 18,500 more specimens in the duplicate collection, 3,490 inflated larvæ, the types of 1,246 species and varieties, besides a great mass of alcoholic larvæ, cocoons, eggs, etc.

As compared with older collections, like that of the British Museum, it naturally appears still in its infancy. Of the families Syntomidæ and Arctiidæ, recently catalogued by Sir G. F. Hampson, the British Museum contains fully 75 per cent. of the world species. Our museum cannot count over one-sixth as many. The same proportion doubtless holds throughout most of the families of the moths. The butterflies would show somewhat more favorably. It should be remembered that but little support has been accorded the collection in a financial way. There is no fund for the purchase of specimens, and the salaried custodians have always been too few. Fortunately the Department of Agriculture has lent a continued and very essential aid. We reciprocate by the loaning of material and the services of the custodian

in identification of insects, finding of synonymy, references to literature, etc.

The duplicate collection had, for a long time, contained half of the total number of specimens, and is still large. It is somewhat of a problem what to do with it. We have practically abandoned making exchanges, because of the poor condition of a majority of the specimens, since all the good material is in the regular collection. Most collectors will not receive what we have in exchange for their own fresh material, and many will not take it at all. Besides, the labor of making exchange lists and the time that would have been consumed would have largely prevented the work of installation that has been accomplished. The duplicates are gradually being made available by school teachers and others, and it is intended to prepare from them a respectable public exhibit collection, and keep this replenished from the same source. At present there is practically no such exhibit, at least arranged with any system, but with the present support it is impossible to prepare one.

The study and identification of the material has progressed to some extent, but the routine work of installation has prevented any very general work in that direction. Mr. August Busck, of the Department of Agriculture, has begun some studies on the American Tineids, which promise to be of material assistance to the collection. A catalogue of the Lepidoptera of North America is being prepared for publication, and it is intended to mark in this those species still lacking to the collection. We hope for considerable accessions from American collectors when they know exactly what is needed.

It will be noticed that the collection of Lepidoptera experienced a period of activity at the beginning, followed by a period of stagnation, now again succeeded by one of activity. These active periods were synchronous with the presence of a Lepidopterist in charge. The deduction is general, and shows it to be highly advantageous that each order of insects should have a custodian especially interested in it. Even with the best intentions, one whose training and activities lie in another field can scarcely do more than keep a collection in a condition of preservation, not to speak of planning for its extension and arrangement and the seizing of all possible opportunities to secure material and interest others in it.

In 1892, Dr. J. B. Smith, ex-curator and a Lepidopterist, visited London, and secured a promise from a well-known gentleman of the gift of his collection, probably the largest in the American fauna, as a whole, in existence. But Dr. Smith was no longer in charge of the collection at Washington, which was entering upon its period of stagnation. General confidence in the national collection as a fit repository for valuable material gradually waned. This was to a certain extent unjust, as the material was well cared for, though not actively elaborated. So, under advice of fellow entomologists, the promise lapsed and Mr. Schaus gave the whole of his non-American material to the American Museum of Natural History in New York. This museum had in charge a competent curator actively interested in Lepidoptera.

Within the last year only have Mr. Schaus' American butterflies been secured for Washington, but by an entirely new arrangement.

It may not be out of place to notice the collection of Orthoptera in the National Museum, because this so well illustrates in its present state the condition into which a collection falls without a specialist in charge. The Orthoptera are the only order of insects which have never been in charge of a specialist nor had any attention from a resident student. A part of the collection is in museum drawers, through the labors of Messrs. Linell and Currie at odd times, but most is still in the old dangerous double book boxes and Schmitt boxes belonging to the Department of Agriculture. Museum pests have been very generally excluded, but the moving and removing of the boxes out of the way of more active collections has caused specimens to become loosened and fall about, creating considerable damage. No opportunity for repairs has been offered. The collection is, as a whole, sadly disarranged. New material could not be incorporated from lack of time and from unfamiliarity with the classification of the order, so that each accession is separately placed in its drawer or set of boxes. Glaring errors in identification occur, species of different groups, superficially similar, being placed above the same label. There is no attempt at securing new material on a regular plan, the accessions being all by chance. What degree of order exists is mostly due to the study given certain groups by specialists to whom they have been loaned. But this method has disadvan-

tages. Most students keep material for an unconscionably long period during which the museum drawers are conspicuous by their emptiness. It is then subjected to the danger of damage or loss in transit, besides various vicissitudes while in the hands of the student, not to mention the occasional risk of unfair treatment at the hands of an overtrusted and presumably honest correspondent.

But the collection of Lepidoptera was never in so unfortunate a condition as this, and its future at present seems most promising.

To consider the present condition of the collection in somewhat more detail, it at once appears that the number of specimens now present, approximately 121,000, exclusive of alcoholic material, pupæ, eggs, etc., is not as much as would be expected from the figures quoted above. I have given 121,000 as the probable total in 1894, and since that date we have received over 50,000 specimens in four of the largest accessions, besides many smaller ones. What has become of them?

In the first place, the 121,000 of 1894 included alcoholic larvæ, as I suppose. Of these we have a great mass, as above stated, but probably not 50,000; 5,000 might be a conservative estimate. Secondly, the former estimates are probably grossly overstated.*

I learn that no actual count was made, but that the yearly accessions, as shown by the books, were added to the last year's estimate for that of the following year. This method is not even theoretically correct, as it makes no account of exchanges, by which a number of specimens, approximately equal to the accession, actually leave the collection. Practically, also, it is faulty, since a considerable proportion of unsolicited accessions find their way at once to the waste basket, besides which accidents and other unavoidable wastes occur. Thirdly, the estimates are given for the total number of insects, and I have taken one-fifth as the probable proportion of Lepidoptera. This is not unlikely too high a proportion for the latter years with the great increase in the col-

* There seems to be a general tendency to overestimate insect collections. The Neumœgen collection, when actually counted by Mr. Doll, was but half of the supposed amount. Dr. Skinner estimates the Strecker collection at 200,000 (Ent. News, xiii, 2, 1902); but my own estimate, made in Dr. Strecker's presence, was 100,000, and I believe a very liberal one.

lection of Coleoptera. One-fifth was the proportion of Lepidoptera in the Riley collection, and it is the proportion that the number of types of Leidoptera bears to the total number of types in the National Collection of Insects. But Riley was, by preferference, a Lepidopterist, and therefore likely to have had more than a normal proportion of this order in his collection, while in the matter of types the Lepidoptera are possibly better off than other orders, owing largely to the generosity of Dr. J. B. Smith. It is proper to state that the last figures, now discussed, are based on an actual count, conducted by my assistant and myself.

The arranged collection is housed in 1,113 drawers; the unplaced material and duplicates are in miscellaneous boxes.

Excluding the duplicates and unworked material, which cannot be satisfactorily discussed, and excluding also the Schaus collection, which is intact, the butterflies comprise, in round numbers, 15,600 specimens of 2,400 species, with 290 inflated larvæ. There are but 29 types in this group. The North American fauna is well represented, especially in the larger species. The collection is poorest in the Lycænidæ and Hesperidæ. The Schaus collection, when added, will nearly double the total number of specimens. The Sphingidæ comprise 1,200 specimens of 250 species, 100 larvæ, but no types whatever. The Saturnians, 880 specimens of 168 species, with 220 larvæ and one type. The Arctians and allied families have 4,750 specimens, 860 species, 460 larvæ and 48 types. The Noctuidæ, 16,800 specimens of 2,370 species, with 550 larvæ and 509 types. The North American Noctuids in the National Museum are probably the best collection in existence in this field. One-half of the types belonging in the regular collection are in the Noctuidæ. The Lasiocampidæ, Liparidæ and allied small families have 3,400 specimens of 500 species, 690 larvæ and 17 types, being especially rich in inflated larvæ. The Geometridæ have 8,700 specimens, 1,200 species, 450 larvæ and 103 types. The North American species are well represented on the whole, though a considerable number are missing. The Sesiidæ, Limacodidæ and other allied small groups have 2,580 specimens, 470 species, 170 larvæ and 29 types. The Pyralidæ and Pterophoridæ have 9,200 specimens of 1,370 species, 110 larvæ and 47 types. A great many North American species are lacking in this group and the following,

probably 50%. The Tortricidæ have 4,900 specimens, 724 species, 77 larvæ and 33 types. The Tineidæ (sens lat.) have 12,150 specimens of 1,800 species, 56 larvæ, and 179 types. They are pretty well represented in some groups, though the series of specimens are too short. In larvæ they are very deficient, though fairly rich in types. Except in the European fauna, there are practically no exotic Tineids in the collection. Following is the census of the collection in tabular form:

Census of the Lepidoptera in the National Museum, December, 1901.

	Specimens.	Species.	Types.	Larvæ.
Butterflies	15,606	2,408	29	290
Sphingidæ	1,214	251	0	109
Saturniidæ	882	168	1	170
Arctiidæ, etc	4,756	863	48	402
Noctuidæ	16,807	2,367	509	545
Lasiocamipdæ, etc	3,390	505	17	687
Geometridæ	8,727	1,233	103	449
Sesiidæ, etc	2,582	471	29	172
Pyralidæ, etc	9,216	1,366	47	111
Tortricidæ	4,940	724	33	77
Tineidæ	12,146	1,797	179	56
Hofmann moths in boxes	1,132	....	....	....
Total regular collection	81,398	12,153	995	3,068
Schaus collection	10,000	....	220	....
Other unplaced material	8,134	....	31	421
Duplicates	18,560	....	....	208
	118,092	12,153	1,246	3,697
Add larvæ as above	3,697			
Total specimens	121,789			

At the conclusion of the address, it was discussed by several members present.

Mr. Ashmead emphasized the necessity of having a custodian in charge of each order of insects. He paid a tribute to the faithful and zealous work of Mr. Linell in caring for the collections, and mentioned some of the difficulties and drawbacks under which he labored. Much of the time he worked entirely unassisted, and

it was thus obviously impossible for him to properly care for so large a collection, covering different orders. Mr. Ashmead also made a statement of the condition of the collection in other orders than Lepidoptera, mentioning in particular the Coleoptera and Hymenoptera, and referring to the enormous number of types in the latter—greatly in excess of those in the Lepidoptera.

—The concluding paper was by Mr. C. B. Simpson, and was entitled:

THE ALIMENTARY CANAL OF CERTAIN LEPIDOPTEROUS LARVÆ.

By C. B. Simpson.

(*Author's Abstract.*)

The forms used were the larvæ of *Carpocapsa pomonella*, *Clisiocampa americana*, and *Pieris rapæ*. The alimentary canal is divided both anatomically and embryologically into three regions: the fore-intestine, the mid-intestine, and the hind-intestine. The embryology and general anatomy of these different parts were given, illustrated by sketches.

The fore-intestine extends from the mouth to the mid-intestine, and is composed of the following parts: the mouth cavity, the pharynx, œsophagus, and the œsophageal valve.

Descriptions of these different parts were presented and special attention was given to the embryology and structure of the œsophageal valve which was illustrated by sections. The walls of the fore-intestine consist of an external layer of circular muscles, an internal longitudinal layer, a basement membrane, and a layer of epithelial cells, forming a syncitium, the inner portion of which was strongly chitinized, thus forming a chitinous intima.

The mid-intestine is about half of the length of the canal in full grown larvæ and is the true absorbing organ. The histological elements are: an external layer of longitudinal muscles; an internal circular layer, a basement membrane, a single layer of epithelial cells, and the peritropic membrane. The cells of the epithelial layer are of two kinds, the ordinary epithelial cells and the mucous cells. The structure of these cells was given and sections shown. The peritropic membrane, that membrane immediately enclosing the food, is believed by the author to be the coagulated secretion of the mucous cells.

The hind-intestine has essentially the same structure as the fore-intestine, except that the muscular and chitinous layers are much stronger, especially the circular. The accessory organs present are the Malpighian tubules and the rectal glands.

The functions of these parts were given with special attention to digestion.

Discussion was participated in and questions asked by Messrs. Benton and Gill.

FEBRUARY 13, 1902.

The 166th regular meeting of the Entomological Society of Washington was held at the residence of Mr. J. Kotinsky, 521 Fourth street, N.W., the society being there entertained by the bachelor members. President Dyar occupied the chair, and Messrs. Quaintance, Caudell, Morris, Heidemann, Ashmead, Cook, Vaughan, Howard, Hunter, Simpson, Gill, Stiles, Barber, Currie, Kotinsky, and Patten were also present.

Under the head of Short Notes and Exhibition of Specimens, Mr. Heidemann showed specimens of the ten species of the Fulgorid genus *Scolops* contained in his collection. In a paper by Prof. Uhler, published by the Maryland Academy of Sciences, nine species were recognized. Three more species, however, have recently been described by Mr. E. D. Ball, raising the total number of described North American Scolops to twelve.

—Mr. Ashmead stated that he had recently received from Dr. P. Magretti specimens of the genus *Paracyphonyx*. This genus, erected by Dr. Magretti, was subsequently suppressed by Kohl and made a synonym of *Pompilus*, Fabricius. An examination of the specimens sent, however, has convinced Mr. Ashmead that the genus is good and distinct, though closely related to Pompilus.

—Prof. Cook exhibited some interesting Myriapoda from California, contained in a collection sent him by Mr. Carl F. Baker. One of these represents a new species of *Striaria* and is the second Californian species of this genus known. Another, a specimen belonging to the superfamily Chordeumoidea, is suggestive of the Sumatran *Heterochordeuma* of Pocock.

—Mr. Caudell exhibited drawings, based upon specimens recently received from California, of the male and female of *Timema californica* Scudder. This insect has been classified with the subfamily Anisomorphinæ in the Phasmidæ. It is, however, the only known member of the Orthoptera having three distinct joints to the tarsi. All ten abdominal segments are distinct, instead of only nine, and the legs are attached ventrally

instead of laterally. Mr. Caudell considered it very closely related to the Forficulidæ, the males having forcipated and toothed anal appendages and there being other points possessed in common with the earwigs. It looks very much like a wingless Embiid (*Embia uhrichi* Saussure) from Trinidad.* The systematic position of this insect was further discussed by Messrs. Cook, Howard, and Hunter.

—Dr. Stiles, referring to a disease which has of late proven so fatal to horses in the Philippine Islands, said that it is known as Surra and is closely allied to the tsetse-fly disease of South Africa; it seems to be spread by flies of the genus *Tabanus.* The disease originated in India where *Tabanus tropicus* was the supposed transmitter. Unlike the malarial parasite, which goes through a double life-cycle, a sexual in the mosquito and a non-sexual in man, *Trypanosoma*, the parasite of Surra, has only a non-sexual generation so far as is known. This being the case, the disease may probably be carried by any biting or piercing insect.

Dr. Howard said, in discussing Dr. Stiles' note, that the conditions governing the spread of this disease pointed as well to some biting Muscid allied to the tsetse-fly as to one of the Tabanids, since both are dependent for successful breeding on moisture conditions. The biting Muscids breed most successfully in moist manure and the Tabanids in damp soil muck, while the Surra is well known to be most prevalent in damp localities and during damp seasons. He agreed with Dr. Stiles that the disease is probably carried by either of these types of biting flies.

—Mr. Morris read extracts from a letter from Mr. Pollard, written from Baracoa, Cuba, where the latter, in company with Dr. Edward Palmer and Mr. William Palmer, was making a collection of plants and zoological specimens.

The first paper was by Mr. Caudell and was entitled:

SOME INSECTS FROM THE SUMMIT OF PIKE'S PEAK, FOUND ON SNOW.

By A. N. Caudell.

No tourist visiting the Rocky Mountain region for the first time thinks of leaving without ascending Pike's Peak, that most accessible of the high mountains. During our season's collecting in

* Figured in Mittheil. d. Schweiz. entom. Gesellsch., IX, fig. 2, 1896.

Colorado last year, Dr. Dyar and I followed the general custom and made the ascent. We arrived at the summit of the peak about 4 P. M., and took a walk to see what we could find in the way of insects. A sharp wind was blowing and it was so cold that we feared but little would be found. The summit is one great mass of irregularly shaped blocks of granite. No vegetation was seen except a little grass and a few small, brightly colored flowers, which had found root in a level spot some way down the side of the mountain. Here we found a number of small beetles, *Phyllotreta pusilla* Horn, and we thought this was to constitute the whole of our catch. But fortunately such was not to be the case, for a couple of small snow fields yielded results appreciated only after our return to Washington, when, upon getting their identification completed, I find there are no less than 78 different species. Though we collected many more species lower down the mountain, and ones of more value, it is only these specimens found on snow that I wish to discuss.

There were two of the snow fields, one very small, hardly more than a couple of rods across, and one larger one, something over an acre in area. They lay a hundred yards or so below the Summit House on the south side of the mountain, and were crusted over sufficiently to bear up the weight of a man. The insects were found scattered over the surface and their bodies were partially sunken into the snow. In nearly all cases they were either dead or so benumbed with cold as to be almost motionless. But one exception occurred, that of the little Chrysomelid beetles mentioned above, which were found in great numbers clustered about the bodies of larger insects. They were perfectly active, a number taking flight when disturbed.

With few exceptions all the insects are inhabitants of the boreal region of the foot hills and not true alpine forms. They were doubtless carried to this high altitude by ascending currents of air and, once up, the foolish, inexperienced creatures were attracted to the smooth, glistening snow fields, there to perish.

Not more than half an hour was consumed in gathering the specimens, and at the time I estimated the number of species represented to be not more than twenty. Had I known there were nearly four times that number I would have made further efforts at collecting and additional species would probably have resulted.

For the identifications I am indebted to Mr. Coquillett in the Diptera, and Mr. Ashmead in the Hymenoptera, except the Formicidæ which were determined by Mr. Pergande. Mr. Schwarz named the Coleoptera and Mr. Herbert Barber furnished me with their distribution. Mr. Banks named the single species of Neuroptera, and the Orthoptera I identified myself. The lists of Lepidoptera and Hymenoptera, containing original matter, are signed by their respective authors.

All the larger orders are represented, the Hemiptera leading in point of numbers with 23 species.

Diptera.

Of the Diptera there are fifteen species, the family Syrphidæ being the best represented, there being four species. None of the Diptera are alpine. They are as follows:

Gnophomyia tristissima Osten-Sacken.
One specimen. Ranges from New York to Georgia and westward to Colorado.

Anthrax catulina Coquillett.
Four specimens. Occurs in Washington and northern California.

Erax jubatus Williston.
A single specimen. This species was described from New Mexico.

Microdon xanthopilus Townsend.
One specimen. Described from California.

Syrphus arcuatus Fallen.
One specimen. Occurs from Nova Scotia to New England, westward to Alaska and California; also in Europe.

Sphærophoria sulphuripes Thomson.
One specimen. Described from California.

Chrysochlamys crœsus Osten-Sacken.
A single specimen. Reported from Utah and New Mexico, westward to Washington and California.

Exorista vulgaris Fallen.
One specimen. Occurs in New Hampshire, Idaho, and Washington; also in Europe.

Calliphora erythrocephala Meigen.
" *viridescens* Desvoidy.
One example of each. Both species occur over nearly the whole of the United States, and the first also occurs in Europe.

There also occurred on the snow the following Diptera, all in too poor condition to admit of more than a generic determination.

Tabanus sp. *Phaonia* sp. *Limnophora* sp.
Sarcophaga sp. *Anthomyia* sp.

All these species were represented by single specimens except the last, of which there occurred eight examples.

Hymenoptera.

Agapostemon splendius Lepeletier.
One female specimen.

Halictus sp.
One specimen.

Copidosoma sp.
One specimen.

Amblyteles suturalis Say.
Three female specimens.

Cryptus persimilis Cresson.
One female specimen.

Anomalon sp.
One female specimen.

Tryphonid sp.
One specimen.

Banchus abdominalis Cresson.
Two specimens.

Cremnops (*Agathis*) *vulgaris* Cresson.
Nine specimens.

The collection contains eleven specimens of Formicidæ, constituting two species (one *Camponotus* and one *Formica*.) Both males and females occur, but no workers; therefore the species could not be determined.

Lepidoptera.

By Harrison G. Dyar.

Ctnucha venosa Walker.
One example. The species flies in Mexico, Texas and Colorado, and has been taken in the canyons of the Rocky Mountains. It is not uncommon, yet was not taken by us on this trip, except this example on the snow.

Gnophæla latipennis Boisduval.
One example. The species was flying at the Half-Way House and had been abundant there a week previously. It was seen also in several of the canyons.

Carneades perexcellens Grote.
One example in poor condition, rendering the identification uncertain. The moth is a common Noctuid of the foot-hills.

Clisiocampa fragilis Stretch.
Fifty examples. The species was occuring in countless numbers above the Half-Way House, where acres of aspen trees had been defoliated by the larvæ. The moths were flying in swarms all day about the leafless trees, which were loaded with their cocoons like fruit.

Cacœcia semiferana Walker.

Three specimens. These were the true *semiferana*, the oak-feeding species, doubtless from the oaks in the canyons near Manitou. The box-elder species, which has been confused with this, has the same markings, but is much paler, often nearly uniformly creamy white with marks obsolete. It may be called *C. negundana*. There are likewise two forms under the name *C. argyrospila* Walk. The bright reddish or ochraceous one may be called *C. vividana*. I will refer to these more fully in treating of the larvæ collected in Colorado.

There also occurred three specimens of a Pyralid, all in such poor condition as to preclude the possibility of even a generic determination.

The species normally living above timber line and which were flying in fair numbers at the time, such as *Colias meadii*, *Argynnis helena*, *Chionobas semidea*, two species of *Anarta* and several Tortricids and Tineids, were not taken on the snow.

Coleoptera.

The Coleoptera come next to the Hemiptera in point of numbers, there being twenty species.

Amara (*Lirus*) *brunneipennis* Dejean.

Six adults and one larva. This is a true Alpine species. It is found in Labrador and has been taken in Colorado, on Mt. Lincoln, at an altitude of from 11,000 to 13,000 feet. It also occurs in New Hampshire.

Selenophorus pedicularis Dejean.

One specimen. Widely distributed east of the Rocky Mountains.

Silpha inæqualis Fabricius.

A single specimen. The National Museum contains specimens from various localities from Texas eastward.

Hippodamia convergens Guérin.

Half a dozen specimens. Distributed all over the United States.

Harmonia picta Randall.

One specimen. Occurs all over the United States.

Nitidula ziczac Say.

One specimen. The whole of the United States.

Podabrus lateralis LeConte.

Two specimens. Occurs in Colorado, Arizona and Utah.

Collops bipunctatus Say.

One specimen. There are specimens in the collection of the National Museum from Colorado, Kansas, New Mexico, Arizona and Idaho.

Tetropium cinnamopterum Kirby.

One specimen. Northern and Western States, Indiana, Alaska.

Acmæops atra LeConte.

A single specimen of this seemingly rare species was in the collection. The specimens in the National collection are from Washington and Montana.

Monohammus scutellatus Say.

Widely distributed over the United States.

Acanthocinus obliquus LeConte.

Three specimens. Western States.

Pogonocherus mixtus Haldeman.

United States east of the Rocky Mountains, Idaho.

Orsodachna atra Ahrens.

Two specimens. British Columbia and the whole of the United States.

Diabrotica tricincta Say.

A single specimen. Arizona, Colorado, New Mexico.

Trirhabda canadensis Kirby.

Three specimens. British Columbia and the whole of the United States.

Phyllotreta pusilla Horn.

Numerous examples. Very common in the southwestern States.

Epicauta sericans LeConte.

Occurs all over the United States.

Cantharis nuttalli Say.

One specimen. The specimens in the National collection are from Montana, Minnesota, Colorado, Wyoming, and Idaho.

Cleonus quadrilineatus Chevrolat.

One specimen. United States west of the Mississippi.

Orthoptera.

There were but two species of Orthoptera taken. *Melanoplus atlanis* and *Mestobregma kiowa*. The highest altitude at which *M. atlanis* is recorded as having been taken is 9,500 feet in Utah, where Prof. Scudder took it over twenty-five years ago. It occurs above timber in the mountains of New Hampshire (6000 feet). *M. spretus* is the species that has been reported as common in high altitudes in Colorado, and has been taken by Prof. Scudder on Pike's Peak. But I saw no specimens of this species anywhere in Colorado, and Prof. Gillette, the Entomologist of the Colorado Experiment Station, says that it has not been taken in the State for over seventeen years. Mr. W. D. Hunter tells me, however, that he took a few specimens in 1897 at Julesburg.

Mestobregma kiowa abounds throughout Colorado, and Prof. Scudder took it at Manitou, but it has never before been recorded from high altitudes. I took one adult female and two young nymphs, which, I think, belong to this species.

Hemiptera.

By O. Heidemann.

In this small but interesting collection are represented five families, *i. e.*, Pentatomidæ, six species; Coreidæ, four species; Lygæidæ, eight species; one species of Capsidæ and one of Aradidæ, besides two species of Homoptera.

Podisus cynicus Say.

Twelve adults and one larva; males and females. Six of these specimens evidently belong to another species, probably *P. bracteatus* Fitch. This species is considered by some American authors as synonymous with *P. cynicus* Say. But the writer has lately had occasion to examine Fitch's type specimen, a female (U. S. Nat. Mus.), and to compare the same with specimens of *P. cynicus*, and there seems to him no doubt that *P. bracteatus* will have to stand as a separate species. The female genitalia are decidedly distinct in these two forms; there are also differences in the shape of the body, which in *P. bracteatus* is comparatively broader and shorter. However, more material from other localities will have to be examined, and especially the male characters, before a definite conclusion can be reached.

Murgantia histrionica Hahn.

One example, showing the general pattern and colors. This bug originally came from the subtropical region, but has invaded the Southern and nearly all the middle States of North America. In some localities it is propagating in great numbers on the leaves of cabbage plants.

Peribalus limbolarius Stal.

One specimen; common; found in the northwestern and Atlantic States.

Pentatoma (*Lioderma*) *sayi* Stal.

Five specimens; three males and two females. It occurs in the western United States and is quite abundant in some localities.

Pentatoma (*Lioderma*) *uhleri* Stal.

A single specimen. This seems to be a strictly western form. From the other species it can be easily differentiated by the more rounded body, and by the white or yellowish-white margins of the thorax and base of elytra. It is recorded also from Mexico.

Thyanta custator Fabricius var.

Seven specimens; three males and four females of the pale green variety, without the usual red band across the thorax, or

red markings on the sides. This species is very variable and is common throughout the United States and in Canada.

Thyanta rugulosa Say.

Five specimens, all females. A western species; the specimens vary sometimes in the length of the third and second antennal joints.

Alydus conspersus Montandon.

One specimen, a female. Inhabits the western and northern States, and can be distinguished from other species of the genus by the round, dark spots scattered over the thorax, elytra and membrane.

Alydus pluto Uhler.

One specimen, a female; often confounded with the black forms of *Alydus eurinus* Say, but it is deep black throughout, more robust and very hairy. A more northwestern species, also found in Canada.

Stachyocnemus apicalis Dallas.

One specimen. This species, although considered rare, has a wide geographical distribution. It was originally described from Florida, has also been found in the northwestern States, and has lately been taken by the writer in the District of Columbia.

Dorachosa illuminatus Distant.

One example of the variety *D. umbrosus* Dist., with the legs entirely black. This species has often been confused with a European species, *Microtoma carbonaria* Rossi, but *Dorachosa* is smaller and the thorax differently shaped. It was originally described from Mexico. The species is widely distributed. It occurs also in the eastern States, and has been taken in the District of Columbia underneath stones.

Harmostes reflexulus Stal.

One specimen, a male, of the pale variety that occurs mostly in the western States.

Emblethis arenarius Linnæus.

Three specimens. A European species, probably introduced; found all over the United States and in Canada.

Trapezonotus (*Sphragisticus*) *nebulosus* Fieber.

Three specimens. It is also a European species, quite common and widely distributed.

Nysius californicus Stal.

One example. Not uncommon. It has also been occasionally found in the eastern States.

Nysius angustatus Uhler.

Numerous specimens. This is a very common bug, and has been found in nearly all the States and in Canada.

Ischnorhynchus didymus Zetterstedt.

Three specimens. A common European insect; it has become quite common here also, and is found all over the United States and in Canada.

Lygæus turcicus Fabricius.

A fine set of specimens of the variety *L. reclivatus* Say, that shows the white markings on the membrane very distinctly. The species is very abundant.

Melanocoryphus fascetus Say.

Four specimens. The species is described by Say from Florida. It is subject to great variation in the red markings on the thorax and abdomen. The bug inhabits the southern States and the West, and seems to be very common in some localities. Specimens of this species have previously been found on the snow fields of Pike's Peak.

Lygus sp.

One example of a Lygus. It is too much distorted for specific determination.

Aradus sp.

A single specimen, a male. Probably a new species, but having only one specimen, and not knowing the other sex, it is not advisable to describe it.

Idiocerus lachrymalis Fitch.

Thamnotettix sp.

Neuroptera.

Limnephilus concolor Banks.

Three specimens, the only species of Neuroptera represented in the collection. The species has never before been reported from Colorado, though it probably occurs quite widely distributed through the northwestern States. It was described from the State of Washington. These specimens taken on snow were in very poor condition and very much resembled the rubbed specimens of unidentified Pyralids mentioned under the head of Lepidoptera.

In discussing the paper, Dr. Dyar referred to the extreme abundance of *Clisiocampa fragilis* on Pike's Peak almost up to the timber line. Mr. Cook remarked that the Myriapoda were especially good material for the study of geographical distribution, as their manner of life restricted their range very effectively. With the exception of a few large centipedes, one almost cosmopolitan species being mentioned in particular, hardly any myria-

pods have been introduced from one country into another. Dr. Stiles asked whether any physiological observations had ever been made as to the effect of high altitudes upon insects. Dr. Dyar replied that Dr. Scudder had reported that certain species found in high altitudes seemed to lose vigor when brought down to a lower elevation. This was the only observation of the kind which he recalled.

—Then followed the paper by Mr. Simpson, entitled:

NOTES ON THE LIFE HISTORY OF THE CODLING MOTH.

By C. B. Simpson.

(Author's Abstract.)

In the Pacific Northwest there has been much diversity of opinion in regard to the number of the broods of *Carpocapsa pomonella* Linn. During the past few years three broods was the commonly accepted number. In attempting to solve this question of the number of broods, Mr. Simpson found great difficulty in determining the limits of a brood on account of the great overlapping. Upon examining records of larvæ killed under bands, it was noted that at certain times there was a greater number of larvæ under bands than at other times. Numerous circular letters were sent to the Idaho fruit-growers in 1901, asking them to keep band records. These records were tabulated and curves drawn on cross-section paper. Mr. Simpson exhibited a number of these curves. It was noted that on all curves there were two distinct maximums of larvæ going under bands. From these facts he concludes that there are only two full broods in Southern Idaho. A possibility of a third brood was mentioned. Observations in orchards were deceiving. Prof. Gillette had concluded that there were only two broods in Colorado. In Idaho the Codling moth was but little injurious in the transition life zone.

Mr. Simpson exhibited many photographs taken by himself of the insect in its different stages, its work upon fruit, methods of control, and Idaho orchards.

In discussion, Dr. Howard said that he had heard Prof. Gillette's paper on this pest read before the meeting of the Association of Economic Entomologists at Denver last summer. Prof. Gillette then made the sweeping assertion that two broods was the rule for this insect over the whole United States. His conclusions, however, were drawn almost entirely from observing

the life history in breeding cages. Dr. Howard thought that Mr. Simpson's method of observation and record was most surely calculated to furnish the data for correct conclusions.

—The final paper of the evening was by Prof. Cook, and entitled:

THE EARWIG'S FORCEPS AND THE PHYLOGENY OF INSECTS.

By O. F. Cook.

The earwigs are a group of tropical insects with very few representatives in temperate regions. But in spite of their retiring habits they have received a considerable amount of popular attention, because of the fear inspired by the rather formidable pair of forceps carried at the end of the body. Entomologists know, however, that the creatures are quite harmless, and that their forceps are not only free from any poison glands, but are not sufficiently strong to make a wound or puncture. In fact, no adequate explanation of the function of the forceps seems to exist, as evidenced by the following summary of the scientific knowledge of the subject by Dr. Sharp, the eminent entomologist of the British Museum.

"The pair of forceps with which the body is armed at its extremity forms another character almost peculiar to the earwigs, but which exists in the genus *Japyx* of the Thysanura. These forceps vary much in the different genera of the family; they sometimes attain a large size and assume very extraordinary and distorted shapes. They are occasionally used by the insects as a means of completing the process of packing up the wings, but in many species it is not probable that they can be used for this purpose, because their great size and peculiarly distorted forms render them unsuitable for assisting in a delicate process of arrangement; they are, too, always present in the wingless forms of the family. Their importance to the creature is at present quite obscure; we can only compare them with the horns of lamellicorn Coleoptera, which have hitherto proved inexplicable, as far as utility is concerned. No doubt the calipers of the earwigs give them an imposing appearance, and it may be of some little advantage on this account; they are not known to be used as offensive instruments for fighting, but they are occasionally brought into play for purposes of defence, the creatures using them for the infliction of nips, which, however, are by no means of a formidable character."*

For at least one member of this group this deficiency of knowledge can be supplied by the fact that an earwig supposed to be

* The Cambridge Natural History, V, p. 208, 1895.

Labia minor Scudder, common in the vicinity of Washington, uses its forceps to spread its wings, and is apparently unable to resort to flight without the assistance of its caudal armature.

It is well known to entomologists that the hind wings of the earwig differ from those of all other insects, except those of the Staphylinid beetles, in being folded transversely to fit under the short anterior wings, which serve merely as protective covers. The method of folding is, however, entirely different in the two groups, and the suggestion of the above quotation that the earwiguses the forceps to fold the wings seem to be quite erroneous. It was probably borrowed by analogy from the beetles, where the flexible abdomen is used, as it were, to tuck the wings under their covers. The wings of the Staphylinidæ are still expanded when the insect alights, and are sometimes allowed to remain so when neglected through fright or annoyance.

With the earwig, on the contrary, the closing of the wings is instantaneous and apparently quite automatic; when the insect alights its wings are completely folded, and it runs away without the necessity of any of the preliminary contortions of the Staphylinidæ. Moreover, unlike the beetle, the earwig does not open its wings readily or when running. The operation is obviously a special effort which requires it to stand still and exert its undivided attention for a very appreciable interval. The wing covers and wings are soon raised from the body, but the wings do not unfold until, by repeated quick upward movements of the recurved abdomen and forceps they are, as it were, combed out and spread for flight. Occasionally an earwig seems to lose the power of keeping the wings open, and repeatedly falls down after short flights of an inch or two, though apparently making efforts at longer journeys. Instead of direct flights, they often rise and continue to gyrate in a spiral about two inches in diameter.

It is, of course, possible that this observation would not apply to all the winged earwigs, and, to judge from the past, much time will be needed for its verification in the different families and genera of the group. That the present use of the forceps remained so long unnoticed is probably to be explained by the fact that the earwigs, like the termites, are nocturnal or twilight insects, and when disturbed in the daytime never attempt to use their wings, but run for shelter and concealment in the dark. The insects which were seen to fly had been attracted to a light in the evening, and there also flight seemed to be undertaken only when the creatures felt themselves at leisure. When annoyed or frightened they attempted only to run away the faster. Several genera of earwigs, including *Apachya*, collected under similar circum stances in Liberia, were also seen to alight with their wings already folded, and to bend their abdomens while resuming flight, though the nature and object of the movements were not then ap-

preciated or noted in detail. The complexity of the wingfold is such, however, that the need of an accessory organ like the forceps appears by no means improbable, and in the absence of any other suggestion of general pertinence, it seems not unwarranted to proceed on the assumption that the primary use of the forceps of the earwig is the unfolding of the wings.

It is, of course, to be expected that such organs as the forceps would be utilized in other ways, though the failure of entomologists to discover such secondary functions may be taken as an indication that no very extensive adaptation has taken place. The most that can be said at present is that both in the earwig and in Japyx the long, slender hairs with which the forceps are sparingly clothed are an indication that the tactile sensibility residing in the stylets of many insects is at least partially retained. In some genera the forceps have become enlarged and thickened to an extent strongly suggestive of a defensive use, and it is of further interest to note that such forms are often wingless, and that the broadening and thickening of the abdomen tends to diminish the flexibility which is retained by the more slender form and laxer skeletal structure of the winged genera. The unusually broad abdomen of the winged African genus *Apachya* is an exception to this rule, but here flexibility is provided for by the extreme thinness of this part of the body, while the forceps are so peculiar as to suggest the existence of some unique adaptation. There also exist winged species with robust bodies and strong forceps, but, like many beetles, these may make no use of their wings. Indeed, it is easy to understand the evident tendency toward the abandonment of so specialized and difficult, and at the same time so relatively unnecessary an activity as flying seems to be among the earwigs. With the earwigs, as with the termites, the wings probably serve the single important purpose of cross-fertilization, interbreeding, or panmixia, which conduces at once to organic vigor and to evolutionary progress. But owing to their more active habits and their freedom from social organization and caste specialization, the power of flight is of much less vital importance to the earwigs than to the termites, and although the latter use their wings for but a single flight all sexual individuals are winged, while many genera of earwigs long since abandoned flight altogether.

The existence of so many wingless earwigs is not, however, an argument against the use of the forceps with the wings, nor against the adequacy of such an explanation of the evolutionary origin and universal presence of the forceps in this group of insects. Such an objection could be maintained only on the theory that the ancestral earwig was wingless, and that wings have been independently developed by different genera of earwigs, a position which nobody is likely to maintain. It is appreciated, however,

that the failure of any of the wingless earwigs to lose the forceps is not in accord with commonly accepted evolutionary theories. Instead of dropping the forceps with the wings, the caudal appendages have, in some cases, apparently increased in size, and have certainly continued to differentiate in form, attaining, for example, a marked asymmetry in the wingless genus *Anisolabis*, a condition which could not possibly have a functional significance in connection with the wings, and in all probability has none in any other relation. The continued presence of the forceps in the wingless earwigs is, moreover, paralleled as an evolutionary phenomenon by the equally useless multiplicity of form which appears in the forceps of the winged genera. The function here ascribed to the organs in question renders it highly improbable that there is the slightest use in the differences of form, size, and armature of the forceps, and the great variability of these characters also forbids the supposition that any definitely specialized uses remain unknown. Both sexes of *Labia minor* use their forceps in the same manner, though the form of the apparatus is very different, and it is nearly twice as long in the male as in the female. This is probably one of the endlessly numerous secondary sexual differences having no direct use, but perhaps serving an important purpose in contributing to the diversity which many organisms maintain inside specific lines. The general maintenance of a direct proportion between the length of the abdomen and the length of the forceps* supports the view that natural selection has tended merely to keep the forceps long enough to reach back to the wings.

The field of biology abounds, however, in similar phenomena which appear to be anomalous and mysterious when viewed from exclusively selectional or static theories of evolution, but which it seems preferable to interpret as examples of a general law of biological change for its own sake, as it were, and independent of natural selection.†

As accessories of the organs of flight the forceps are, of course, to be looked upon as an adaptation, but from what? Presumably from the jointed stylets to be found in so many groups, but more particularly from such as those of the peculiar insect described by Westwood, under the name *Dyscritina*,‡ but subsequently reported to be the larva of an earwig. Dyscritina, which the writer has observed and collected in Liberia, may be said to com-

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* In a few cases where slender species have short forceps, the abdomen seems to be unusually flexible, but in general the long forceps go with the long bodies.

† A Kinetic Theory of Evolution, Science, N. S., XIII. No. 338, pp. 969–978, June 21, 1901.

‡ Trans. Ent. Soc. London, 1881, p. 601. Pl. xxii, Figs.1–1i.

bine the habits of the earwigs with those of the true Thysanura. It lives among vegetable debris in very moist places, is extremely quick and agile in its movements, is very soft and delicate in texture, and is provided with a pair of long, many-jointed stylets instead of the forceps of the adult earwig. Curiously enough, these are exactly the differences which obtain between Japyx, the only other insect with forceps like the earwig, and the smaller and more thysanuroid analogue of *Campodea* also found in Liberia and described before this Society in 1899, under the name *Projapyx*.* Recently Projapyx has been found to be not uncommon in Porto Rico, and seems always to occur in the same localities as the Porto Rican species of Japyx, that is, in all sorts of situations from moist valleys to the tops of dry limestone hills.

But if Projapyx is really the larva of Japyx, students of the temperate species have failed of their full duty, or else we have found repeated in this order† the strange conditions of the earwigs where some species have a larval stage and a metamorphosis which have been suppressed in the others.

It is realized that this reasoning reverses, for the present case, at least, the opinion held by Lubbock and others that the larval stages of insects are derivative and adaptative, not ancestral and primitive. No reason is, however, apparent why one of these opinions should exclude the other, and in the present instance it seems obvious that from the standpoint of hexapod structure Dyscritina is much less specialized than the adult earwig, or than the larva of the Hymenoptera or Lepidoptera.

If, instead of holding that the Dyscritina stage of the earwig is an adaptation, we interpret it as a more primitive condition, it will be necessary to apply the same reasoning to the orthopterous groups to which the earwigs have been thought to be closely allied. Most of the cockroaches, like most of the earwigs, have no pronounced metamorphosis, but in several genera there is a transformation in both sexes, while in others only the males reach the winged condition. Metamorphosis is more accentuated among the cockroaches than among the remaining orders of Orthoptera, so that the current opinion that these insects are primitive because they have no metamorphoses is self-contradictory.

Having thus emancipated ourselves from the notion that the cockroaches represent the primitive insect type, it will be easier to appreciate at its proper value the long-obvious probability

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* Proc. Ent. Soc. Washington, iv, 222, 1899.

† A separate order Dicellura was established for Japyx in 1896, for the reason that it seemed more remote from the true Thysanura than the latter are from the Orthoptera. See Brandtia, p. 49, July 30, 1896; also Proc. Ent. Soc. Washington, iv, 222, 1899.

that the ancestral distinction belongs to the so-called neuropterous orders with aquatic larvæ and complete metamorphoses. Dyscritina as the larva of an earwig, and Projapyx as the larva of Japyx, bring the orthopterous series closer to the aquatic larvæ of the Neuroptera, with their many-jointed stylets, and thus permit us to think of the archetypal insect as a creature with metamorphosis and with wings instead of beginning with a thysanuran ancestor and being compelled to imagine the wings as appearing "independently at several points" as maintained by Professor Smith.*

For the correctness of this view, that the neuropterous orders with aquatic larvæ are the more primitive,† a large amount of evidence might be brought together, but perhaps the most conspicuous advantage of this standpoint lies in the fact that it permits the suggestion of an origin and method of development for the insect wing, which can scarcely be accounted for by any rational evolutionary theory beginning with the assumption that the first insects were land animals.

The wings of the birds, pterodactyls, bats, fishes, and other flying animals, are known to be modifications of organs used for locomotion in water or on land, but we have been contented to assume that the wings of insects were made, so to speak, from whole cloth, and have failed to associate them as the homological equivalents and derivatives of older structures used for purposes other than flight.

Kinetic evolution views as normal the progressive change of any particular part, but would not prearrange and carry forward the complex and delicate adjustments of structure and function necessary to the perfection of such organs as wings, since, except for flying, wings are about as useless structures for terrestrial insects as could well be imagined, and some representatives of nearly all the orders have abandoned them.

But if the discussion be transferred to the water, we have, so to speak, much clearer sailing. Fins too small for flying are still very useful to fish, and a gradual and natural increase of size of swimming organs to the point where they can be used for flight is illustrated by the analogy of the flying fishes.‡

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*An Essay on the Classification of Insects, Science, N. S., v, p. 671, April 30, 1897.

†The copulatory apparatus of the Odonata, located on the second segment of the abdomen, is paralleled only in the Diplopoda. The paired genital openings of the Ephemerida and the moulting of the insect in adult form are, if possibie, even more primitive features.

‡Some of the so-called flying fish merely soar for short distances on their expanded wings, but others are capable of true flight, not by flapping their wings like birds, but by keeping them in a state of very rapid vibra

The lack of means of aerial existence and of locomotion on land has kept the fish from terrestrial conquests, but aquatic insects are not thus restricted, and thousands of species, including members of many different orders, are still able to make the ancestral substitution of a terrestrial for an aquatic habitat. Many also remain in the water as adults, and use their wings for swimming. Some of the May-flies descend into the water to lay their eggs, and in the genus *Pteronarcys* the adult winged insect has external gills. The most conspicuous suggestion for the formation of wings from gills is, perhaps, to be found in the larvæ of the May-flies, where the gills have become subdorsal and the tracheæ which, in other groups, hang in brush-like clusters, are spread out instead as veins of delicate, leaf-like membranes, and even arranged in a manner strongly suggestive of the patterns of the wings of some adult insects of other groups. The utilization of the anterior pairs of such lamillar gills as swimming organs, and their subsequent further specialization as wings, is thus a supposition requiring no abrupt or improbable change of structure or function, and affords a rational explanation of organs otherwise as mysterious morphologically as the wings of angels.

So much for the argument afforded by the winged and wingless earwigs, and the similarity of the jointed stylets of the earwig larvæ to those of Projapyx and Campodea. Shortly after writing this sketch of phylogenetic possibilities, I received from Dr. Filippo Silvestri,* of Bevagna, Italy, a paper in which my meagre account of the anatomy of the African Projapyx is greatly extended by observations on a South American species. Dr. Silvestri not only agrees with me that Projapyx is the most primitive of insects, but he holds in addition that it proves the descent of the insects from the diplopods, because he finds that the jointed stylets are spinning organs homologous with those of *Scolopendrella* and with those of the diplopod orders Cœlocheta† and Monocheta. But if Projapyx is the larva of Japyx instead of a mature insect, Dr. Silvestri's reasoning must be reversed, and we should prepare ourselves to believe that the Symphyla, Diplopoda and Pauropoda do not represent the ancestors of the hex-

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tion through a small arc, like the insects. The distances traversed are too great, and the rate of speed too slow and too uniform to be explained by the momentum with which the fish leaves the water. This conclusion is the result of many excellent opportunities of observation within the last ten years, principally in the Cape Verde region of the Atlantic. The objection of some ichthyologists that the flying fish is not so constructed as to be able to vibrate its fins in the air would also render these organs useless in the water.

* Boll. Mus. Zool. Anat. Comp. Univ. Torino, No. 399, Sept. 12, 1901.

† Brandtia, p. 41, 1896.

apods, but are, as it were, larviform off-shoots from the insect phylum. In other words, we may compare the diplopods with caterpillars and other larvæ, and may seriously undertake the study necessary to determine the reality of what have been supposed to be merely superficial similarities, such as the form of the cephalic sclerites, the barbed hairs and the repugnatorial pores. *Polyxenus* looks enough like a caterpillar, and its large fossil relative *Palæocampa* would have been even more strongly suggestive of such an affinity.* Moreover, a hexapod origin for the Diplopoda would explain the fact that the diplopod larvæ are hatched with the six anterior legs, the remaining pairs being attached to rings intercalated behind the genital segment. The anamorphous Chilopoda are hatched with seven pairs of legs, but the others are added by intercalation in front of the genital segment, which thus appears near the posterior end of the body in the one group and near the anterior in the other.

In this way it is possible to bridge the chasm which seemed to so profoundly separate the Progoneata (Diplopoda, Symphyla, and Pauropoda) from the Opisthogoneata (Hexapoda and Chilo-

* The barbed hairs of the larvæ of the Merocheta, and the bristles of the Cœlocheta, Monocheta and Colobognatha support the view that the soft-bodied, hairy Polyxenus is the most primitive of existing diplopod types. It may also be said that the skeletons of the different orders of Diplopoda are too diverse to be rationally explained by descent from a single hard-bodied type. In the Merocheta the segmental rings are solid and complete, without even traces of sutures to represent pleural or ventral plates. In the Cœlocheta, Monocheta, and Colobognatha the ventral plates are free; in the Diplocheta, Zygocheta, and Anocheta they are adnate, but are distinct by sutures. The pleuræ are free in the Oniscomorpha and Limacomorpha and in the Siphonotidæ; adnate in the Polyzonidæ and remaining Colobognatha, and in the Monocheta and Anocheta; no traces of pleural elements have been reported in the Diplocheta, Zygocheta, Cœlocheta and Merocheta. Finally, in the order Anocheta, the dorsal part of the segmental ring is composed of three transverse bands, a condition perhaps paralleled only in the larvæ of the saw-flies. From the entomological standpoint these differences would be thought very grave; indeed, they may be said to be altogether too grave for explanation by evolutionary changes in parts already hardened. If, however, we think of them as independent acquisitions of firm armor by soft-skinned animals we have ample analogies in other groups. This interpretation does not, of course, decrease the actual diversity, but it enables us to credit the evidence of the otherwise great similarity of structure and function among the Diplopoda. It permits Polyxenus to be more closely associated with the other Diplopoda, and brings the Diplopoda, as a group, closer to the Symphyla and to the Hexapoda.

poda). That there could be any derivative relationship between a group of animals with the reproductive system opening in the anterior part of the body (Progoneata) and others with the reverse arrangement (Opisthogoneata) seemed impossible, unless the common origin were traced back to worms with unspecialized reproductive segments. Should the present suggestion prove to have a foundation in fact, we shall have firmer ground for believing that the insects and the four classes commonly grouped as "Myriapods" do in reality constitute a natural assemblage.*

Nor do the possibilities of integration end here, since the association of the Progoneata with the insects as derivatives of an originally aquatic group reopens the whole question of their affinities with the Crustacea and Arachnida, and may result in the rehabilitation of the Arthropoda as a natural phylum or primary division of the animal kingdom.

The paper was discussed briefly by Messrs. Simpson, Gill and Stiles. Mr. Simpson said that Prof. Comstock had given serious consideration to the theory that the primitive and original insects were aquatic and winged, but had finally abandoned it as untenable. He had noted that the tracheal gills of certain Mayflies are of almost the same pattern as the wing veins. This similarity, however, he had found to be accidental. Dr. Gill said he thought that there was no ground for believing that insects were derived from myriapods. There was a possibility, however, that they had sprung from an entomostracan type, though this was merely an hypothesis. Insects may have existed in palæozoic times, but there was no evidence of it. He maintained that flying-fish do not have a true flight, but that their enormously enlarged pectoral fins serve merely as parachutes for their sustentation in the air until the initial momentum of the fish leaving the water is exhausted.

Prof. Cook, however, maintained that certain of the flying-fish really progress through the air by a rapid vibration of the wings. He spoke of the resemblance of some geologic Crustacea to the larvæ of certain species of cockroaches as of interest and suggestive.

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* For this the name Labrata was proposed in 1896 (Brandtia, p. 30). The Labrata were deemed co-ordinate with the Branchiata (Arachnida and Crustacea) and the Malacopoda (Peripatus).

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FRANK BENTON, Corresponding Secretary,

Department of Agriculture,

Washington, D. C.

MARCH 19, 1902.

The 167th regular meeting was held at the residence of Dr. L. O. Howard, 1336 Thirtieth street, N.W., President Dyar in the chair, and Messrs. Kotinsky, Simpson, Barber, Benton, Howard, Ulke, Doolittle, Morris, Currie, Ashmead and Hunter, active members, and Mr. H. H. Newcomb, of the Harris Entomological Club of Boston, visitor, also present.

Mr. W. D. Hunter was elected an active member of the Society.

Under the head of Short Notes and Exhibition of Specimens, Mr. Newcomb exhibited photographic prints showing the venation of various insect wings. These prints were made by placing the wings (those of the Lepidoptera being first bleached) upon sensitized paper. He also showed the photograph of an hermaphrodite gypsy moth, one side showing male, and the other female, characters. The specimen from which this last photograph was taken was loaned by Mr. A. H. Kirkland. Mr. Simpson described the method, used by Prof. Comstock, of making tracing-drawings from enlarged photographs.

—Mr. Kotinsky showed a copy of Newstead's Monograph of the British Coccidæ, Volume 1, just issued by the Ray Society, commenting upon the figures and on certain points in the classification as given in that work. He also noted that the Dactylopine scale-insect *Pergandiella americana* Cockerell had recently been found infesting the underground portion of the stems of Kentucky blue-grass (*Poa pratensis*). A very similar species, described by Signoret, had been found on grass stems, but Cockerell's species had previously been found only upon ash.

—Mr. Simpson exhibited a drawing of the photographic apparatus used by him for getting pictures of the larvæ of Hydropsyche *in situ* in the water, and also showed two prints of the photographs obtained. He presented for publication the following abstract of his remarks:

PHOTOGRAPHING NETS OF HYDROPSYCHE.

By C. B. SIMPSON.

Many times while observing the nets of this insect in streams, the writer wondered if they could be photographed *in situ*.

Many attempts were made to do so in Fall Creek, the gorge

of which bounds the Cornell University campus. Many failures were made, but each failure showed another difficulty to overcome. The principal difficulties were as follows: roughness of the surface of the water, splashing of water on the lens, reflection from the sky and lack of sufficient light. The best negatives, from which prints are here reproduced, were secured on a dark day. Without doubt much better results could have been obtained on a brighter day. By consulting Fig. 3, the apparatus used can be easily understood. The camera is the usual vertical camera with a heavy iron tripod base. Between the upstream legs is placed a glass bottomed box which is securely weighted down. About a half inch of water was placed in the box. A focussing cloth was held over the camera to cut out the reflection of the sky. The photographs (Figs. 4 and 5) show fairly well how the nets are built at the edge of a little irregularity of the rock surface.

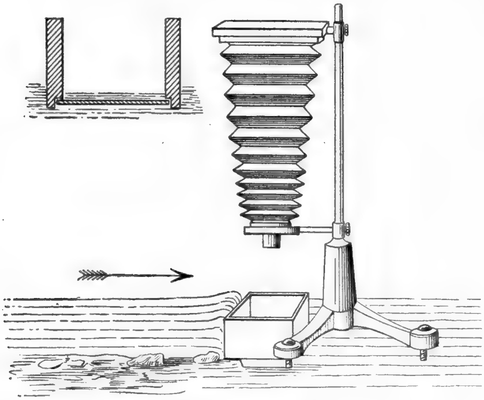

Fig. 3.—Apparatus for photographing objects in shallow, swiftly running water.

—Dr. Dyar presented the following note for publication:

NOTE ON ARACHNIS DILECTA BOISD.

By Harrison G. Dyar.

In the Catalogue Lep. Phalænæ Brit. Mus. Hampson describes the ♀ only of this species. Mr. H. H. Newcomb brought to the National Museum for identification a ♂ Arachnis, captured in Mexico, which is obviously the ♂ of *A. dilecta*. It differs from the ♀ in having the disk of the hind wings white, the crimson ground color being confined to the costal and internal margins. This sexual difference is exactly as in the allied *A. zuni* Neum. from New Mexico, but in that species the ground color is yellow instead of crimson.

—The first paper was by Mr. Ashmead and was entitled "Notes on some South American Chalcidoidea." He stated that it was now fifteen years since he first undertook to work up the

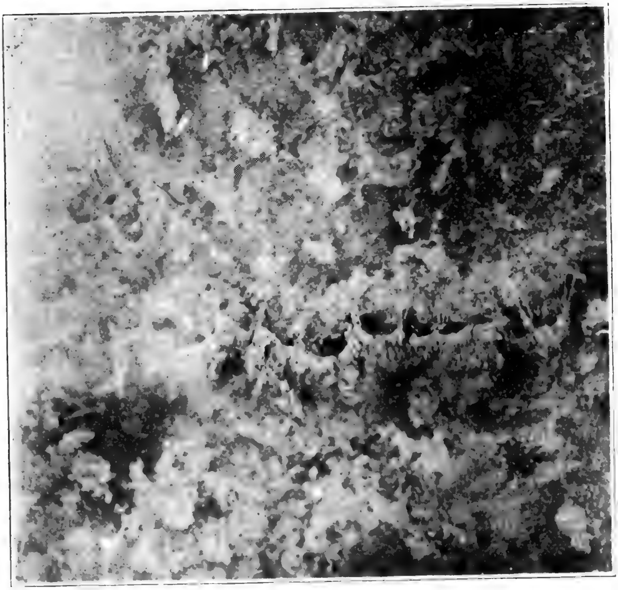

FIG. 4.—Nets of Hydropsyche photographed *in situ*.

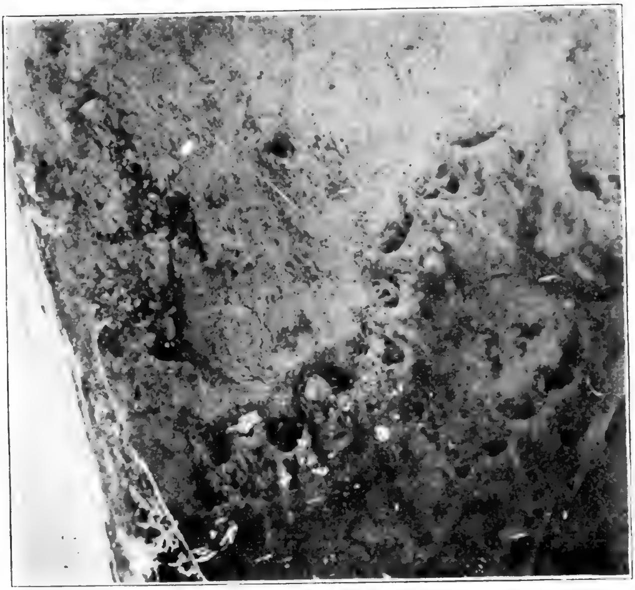

FIG. 5.—Nets of Hydropsyche photographed *in situ*.

collection of South American Chalcids made by Mr. Herbert H. Smith. This collection has recently been purchased by the Carnegie Museum, and Mr. Ashmead has in preparation a classification of the Superfamily Chalcidoidea in which the new genera and species contained in the collection are to be described. He commented upon the striking resemblance that exists between the Central and South American forms. Dr. Howard's conclusions, published in an article in the Wilder Century Book, that there is a definite correlation between the habits and structure of Chalcid flies, were supported by Mr. Ashmead's studies. In those groups in which the habits are known, it has been found that the various species in each tribe have hosts which are also closely related to each other. About sixty drawings prepared for Mr. Ashmead's paper were exhibited by him and he commented upon a number of the many striking and interesting species figured. One in particular, a magnificent Chalcid belonging to Westwood's genus *Pelecinella*, he had named *howardi*. It is nearly an inch in length. This insect belongs to the Cleonymidæ, and as all members of this family whose habits are known are parasitic upon Coleoptera, it seems probable that this species will eventually prove to have some large South American beetle as its host.

The paper was discussed by Dr. Howard. He said that, as parts of Brazil belong to the same faunal region as portions of Central America, he did not think it strange that the Chalcid forms from these countries are similar. He thought it doubtful that the Eucharidæ are parasites of ants. It was possible, he believed, that they might prove to be parasites of some of the guest insects which occur in ants' nests, and which are often larger than the ants themselves. Some of the Eucharids seemed too large to be parasites of the ants.

Mr. Ashmead stated that the group of gall-parasites did not confine its attention to the gall makers of any one order of insects but infested all kinds of galls. He said that in his forthcoming paper he had tabulated about five hundred and seventy genera of Chalcid-flies and had succeeded in placing nearly all of the described genera.

—The next paper was by Mr. Newcomb, and entitled: "An Entomological Trip to Mt. Katahdin, Maine." He gave a very interesting and entertaining account of a trip made by him in

June, 1901, in company with three others, to this mountain.* He described the country traversed on the way thither, along the Penobscot river. Mt. Katahdin is 5,150 feet in altitude and seven miles in length. It consists of three peaks, one to the north and two in the south. Between the two latter stretches a table-land which had hitherto been considered inaccessible. The portion of the mountain leading to the table-land is called "the Slide." It is 1,000 or 1,200 feet long and very difficult of ascent. This table-land, which they succeeded in reaching after an arduous climb, has a growth of mountain hemlocks and sedge, and is strewn with granite boulders. A brownish or blackish-gray moss grows abundantly. Here a species of butterfly belonging to the genus *Chionobas* and, at the time, thought to be *semidea*, but afterwards described by Mr. Newcomb as a distinct species, *katahdin*, was found. The weather was very foggy and cloudy most of the time, so they did not remain long upon the table-land, but Mr. Newcomb and another entomological member of the party returned to it again on the following day. Forty-nine specimens of the *Chionobas* were then secured. When resting upon the moss-covered ground it was well protected by its color. He noticed a curious habit it had of resting with its body and wings lying over sidewise. The wind was very strong and the butterflies flew close to the ground, usually within two feet of it, to avoid being blown down from the table-land. If they were blown off, as sometimes happened, they would strive to get back. Mr. Newcomb made the trip again on the third day. On the way up, *Limenitis arthemis* was observed very commonly, but scarcely any were seen on the return trip.

In the discussion of this, Dr. Dyar said he thought it remarkable that a form of Chionobas not *semidea* should be found on Mt. Katahdin, as *semidea* was the form occurring upon Mt. Washington. *C. katahdin*, though hardly a distinct species, seemed nevertheless to be a good local form or race. Mr. Morris said that botanists have made some very exceptional finds on Mt. Katahdin, but that all their trips made thither have been short.

—The last paper read was the following:

* See Mr. Newcomb's article in *Entomological News*, October, 1901, pp. 225–231.

THE LOG-CABIN BUILDER.

(*Limnephilus indivisus* Walker.)

By C. B. Simpson.

During the spring of 1900, while at Ithaca, N. Y., the writer incidentally made some observations upon the larvæ of this caddis fly. The larvæ were found in abundance in a series of still ponds near Fall Creek during April and part of May. They were found as early as April 9 in 1900 and March 31 in 1901. At these times the larvæ were from one-fourth to half grown. In March, 1901, the winter ice was out, but a thin sheet of ice was present. The upper ponds of the series contain water throughout the season, while the lower ponds are dry about midsummer.

About April 20 the larvæ were nearly all full grown. By placing the cases containing larvæ in a dry box it was found that the larvæ would leave the cases and thus obviate injury or killing the larvæ in removing them forcibly.

When full grown the larvæ are about three-fourths of an inch in length. The head, prothoracic and mesothoracic shields and legs are dark brown or black in color, while the remaining parts are clouded white. The legs are well developed and bear well developed claws. The first abdominal segment bears one dorsal and two lateral tubercles. There are four principal rows of filaments which are nearly white by reason of the trachæ and air contained in them. On each lateral margin of the abdomen there is a row of fine stiff hairs placed closely together. The caudal segment of the abdomen bears two prolegs which are armed with strong hooks. The use of these structures is evident upon examining the habits of the insect. The tubercles and the prolegs are used to hold to the inside of the case. The filaments are respiratory, and the rows of fine hairs are for inducing currents of water.

The cases of the younger larvæ consist of small sticks, grass stems, leaves and moss arranged in a more or less irregular manner. The material of which the cases of the older larvæ are built depend in a great measure upon the material in hand: when an abundance of leaves is present in the bottom of the pond these are for the most part used, and, in many, leaves alone constitute the case. These bits of leaves are placed one upon the other at right angles to the axis of the case, and silk is used to fasten them in place. These are placed around the entrance to the case in an irregular manner, and are always eaten so as to make a smooth interior although the exterior is irregular. When larvæ are placed in an aquarium they feed from each other's cases and break off pieces and incorporate them in their own

cases, both of which tends to make the exteriors regular. When bits of sticks are used they are placed, as with leaves, at right angles to the axis of the case. Sticks as large as one-fifth of an inch in diameter are often used. The larvæ were observed to eat out a notch in the inner side of the stick when in place. It is quite a task for one to fasten one of these large sticks securely, and many times the larvæ get into difficulties by adding sticks that are so bouyant that they come up to the surface. The insect thrusts its body out of the case, jerks and beats the water violently until a chance foothold is secured, when it crawls to the bottom. The larvæ immediately begin to build themselves a new case when deprived of the old one, and can complete a case in one night. Experiments were tried by giving the larvæ small stones with which to build a case, and in no instance were the larvæ successful. Snail shells with living snails are sometimes used in the cases. A cherry-pit was noted. One larva used two wheat kernels which sprouted and caused some inconvenience to the occupant. When cases were given naked larvæ they immediately crawl into these head first, but in a short time one finds them in their normal position.

The contents of the alimentary canal of several larvæ were examined. In all instances vegetable matter such as leaves and wood was found. The alimentary canal is remarkable on account of the great development of the muscles, particularly the circular.

The first pupation was noted on April 28, and practically all had pupated by May 16. Strong silken nets were found at either opening of the case; the cephalic opening being largest. In an aquarium a few cases were found attached to the sides of the glass jar, while in the pond they could attach themselves to the lower side of leaves. Some were found standing on end in the bottom of the pond. In all places it was noted that the insect and its case were in such a position that no mud could enter the case by the circulation.

The pupæ are very delicate, of a white, and later of a pink, color. The most interesting structure is the lateral fringe of stiff hairs which was noted in the larvæ. In the pupæ these hairs are larger and are present on the caudal end as well as the lateral margin. By placing a case, containing a pupa, in a dish of water containing carmine the circulation of water through the case was observed. Without doubt this circulation is produced by a gentle undulatory motion of the abdomen, which action would be greatly aided by the fringe of hairs.

The first adult emerged May 29. The pupæ break the cephalic net and swim to some projecting stick upon which they crawl out of the water. The skin splits in the usual way and remains fastened upon the stick by the claws for some time. Many adults

were observed on the weeds and grasses in and about the ponds. The adults are of a straw color and have a green abdomen. The adults were kindly determined by Mr. Banks.

No eggs were obtained in spite of the many efforts. On account of regular work it was found impossible to further trace the life history of the insect.

Mr. Ashmead asked Mr. Simpson if the larva have an organ of attachment, and mentioned a larva of the neuropterous genus *Raphidia* from Oregon, received alive at the National Museum. It attached itself very tenaciously to the desk by a suctorial disk on the end of the abdomen. He called attention to a figure of a Raphidid larva published in the Cambridge Natural History. Referring to the trichopterous larva, Mr. Simpson said he had never noted such an organ in trichopterous larvæ.

April 17, 1902.

The 168th regular meeting was held at the residence of Mr. J. D. Patten. The following members were present: Messrs. Howard, Stiles, Kotinsky, Busck, Patten, Benton, Simpson, Marlatt and Hunter; also Messrs. Cattell and von Schrenk, visitors. In the absence of the President, the meeting was called to order by Mr. Patten.

Under the heading Short Notes, Dr. Stiles called the attention of the Society to a paper in a recent medical publication* in which the author described experiments tending strongly toward proof of the transmission of dengue or break-bone fever by species of the genus *Culex*. This note was discussed by Dr. Howard.

—Dr. Howard mentioned the fact that had recently been brought to his attention that the Cuban *Anopheles argyritarsis* Desvoidy breeds at times in water retained in impressions made by the feet of cattle. This observation, tnough not unique, is as yet unpublished, and has an important bearing upon the possibility of the destruction of malaria-bearing mosquitoes.

—Dr. Stiles asked the opinion of the Society in the matter of

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*Med. Rev., N. Y. (1631), Vol. 61 (6), pp. 204–207, Figs. 1–8, February 8, 1902.

the proposed investigation of the relative feasibility of the various canal routes in Central America as far as mosquitoes and the diseases transmitted by them were concerned. After some discussion the following resolution was proposed by Mr. Benton and unanimously passed:

Resolved, That it be the sense of the Entomological Society of Washington that a commission of scientific men, at least one of whom should be an entomologist, should be appointed to visit Central America to investigate the feasibility of the different proposed interoceanic canal routes as regards the prevalence of diseases transmitted by mosquitoes, the possibility of controlling the breeding places of such mosquitoes, and the consequent restriction to shipping interests by quarantine regulations that might be necessary in the different localities.

—Mr. Benton called attention to some recent observations he had made to the effect that the Cyprian race of bees preserves its drones much longer than any other race.

—Upon motion of Dr. Howard, the reading of the papers on the regular program was postponed in order that Mr. Marlatt might give the Society an account of his recent travels. Mr. Marlatt then proceeded, with the aid of maps, pictures and specimens, to narrate the results of his trip around the world, paying especial attention to the observations made in Japan that led him to the conclusion that that country is not the original home of *Aspidiotus perniciosus*. Extended observations in China, however, demonstrated, in his opinion, that the insect is there strictly indigenous.

MAY 8, 1902.

The 169th regular meeting was held at the residence of Mr. E. A. Schwarz, 230 New Jersey avenue N.W. President Dyar occupied the chair, and Messrs. Schwarz, Howard, Ulke, Busck, Barber, Kotinsky, Gill, Ashmead, Marlatt, Patten, Heidemann, and Currie were also present.

Upon motion by Dr. Howard, the Society moved to suspend the rules, and unanimously elected Mr. Ulke an honorary member.

Under the heading Short Notes and Exhibition of Specimens,

Mr. Ashmead mentioned that bees of the genus *Andrena* were said by Mr. Sherman to be injurious to grass. Discussed by Messrs. Howard and Schwarz. The latter remarked that similar injury done by the burrowing of a Nomia (*N. nevadica* ?) was noticed by himself, in 1880, near Selma, Ala. A piece of pasture land overgrown with Lespedeza showed bare spots, or dying plants, where the burrows of the bee abounded. A Rhipiphorid beetle (*Myodites semiflavus*) and several Mutillas were bred from the cells of the bee.

—Mr. Heidemann exhibited specimens of *Diaditus pictipes* Champion received from the town Hidalgo, on the Rio Grande river, in southern Texas. This is one of the smaller Reduviids, evidently belonging to the subfamily Stenopodinæ. The genus *Diaditus* was founded by Stal upon a specimen from Montevideo, Uruguay, which he named *semicolon*. Another species, *Diaditus annulipes*, was described by Berg from Buenos Aires, Argentina. Two more species, *D. hirticornis* and *D. pictipes*, were described by Champion from Panama and Mexico, in the Biologia Centrali-Americana, and to this last-mentioned species Mr. Heidemann's specimens from Texas belong. The genus *Diaditus* has not previously been recorded as occurring north of the Mexican boundary.

—Mr. Schwarz exhibited a specimen of a Lucanid beetle (*Dorcus parallelus* Say) which was completely covered with mites, its size being thereby several times increased. The identification of the specimen in this condition was attended with considerable difficulty. Beetles and other insects were often more or less infested with mites, but it was very rarely that a specimen was found completely covered by them as in this instance. Such a specimen was figured, the species infested being *Carabus auratus*, in the Berliner Entomologische Zeitschrift, Volume XVII, Pl. I, Fig. 2, 1873, by Dr. G. Kraatz. The mite, in the case of the Lucanid, is an immature form of a Gamasid and not determinable.

—Mr. Busck spoke of the peculiar cocoon of a Tineid moth (*Marmara salictella* Clemens) which is covered with masses of small round white bubbles like shot. It was a matter of conjecture what these were and how they came there until Mr. Busck, in studying the habits of the living larva, watched it while engaged in spinning its cocoon. A framework of silk was first

spun, and then the larva blew out the bubbles from the anal end of its alimentary canal and thrust them through the framework so as to make a covering for the outside of the cocoon. The bubbles were examined with a microscope, but no trace of silk could be found in them. Mr. Busck stated that, in the stage before the last, the larva is flat and footless; in the last stage it has feet and is round and slender. The note was discussed by Messrs. Howard, Gill, and Ashmead. Dr. Howard called attention to a note by Paul de Peyerimhoff in the Annals of the Entomological Society of France, Vol. LXX, 1901, pp. 150–152, on the mechanism of the batching with the Psocidæ. He wanted to especially point out that the author, in describing the peculiar habit of the issuing embryo of swallowing mouthful after mouthful of air in order to swell its body and assist in bursting the enveloping membrane, was anticipated by H. G. Hubbard. Peyerimhoff had been unable to find any former record of this peculiar habit with the Psocidæ, but the speaker pointed out that Hubbard, in 1885, in his masterly volume on the insects affecting the orange, on page 195, described this process exactly with *Psocus citricola* Ashmead.

—Mr. Kotinsky reported to the Society some observations he had made upon the larvæ of *Chilocorus similis*, recently brought from China by Mr. Marlatt, which, he thought, might raise a question as to the distinctness of this species from *C. bivulnerus*. The larvæ of *similis*, when in the jar in which they were reared in the Department, were light colored, distinctly lighter than are larvæ of *bivulnerus*; afterwards, when they had been exposed to the light for some time in a breeding cage, they became darker, so that they looked very much like *bivulnerus* larvæ.

—Mr. Marlatt said he thought Mr. Kotinsky had stated the matter rather too strongly. He thought that the change of color was not due to change in the color of the larval integument, but rather to a difference in the proximity of the spines, brought about by a larval moult. He believed that *similis* larvæ differed from those of *bivulnerus* and could be distinguished.

—Dr. Dyar read the following note:

NOTE ON A CALIFORNIAN FRUIT WORM.

By Harrison G. Dyar.

Dried fruit, infested with "worms," which proved to be lepidopterous larvæ, were received at the Department of Agriculture from Santa Clara County, California. The resulting moths were *Vitula serratilineella* Ragonot. Their larvæ show some peculiar points of structure.

Egg.—Elliptical, flattened above and below, symmetrical, rounded; soft-skinned, coarsely granularly shagreened; somewhat translucent, pale yellowish or wood color. Size about .6 × .4 × .3 mm.

Larva.—Head rounded bilobed, the vertex retracted in joint 2, somewhat flattened before and erect; clypeus not reaching the membranous vertical triangle; red-brown, sutures of clypeus and mouth darker, ocelli black. Body cylindrical, tapering slightly toward the ends, segments dorsally 2-annulate; feet normal, small, pale, the abdominal ones with crochets in an ellipse. Cervical shield distinct, large, transverse, luteous translucent, brown at the marginal tubercles. Anal plate darker luteous. Body whitish, rather opaque, a red dorsal shade at maturity. Tubercles small, dark brown; iib of joint 3 and iii of 12 and all those of joint 13 enlarged. On joint 13 dorsally there is a single medio-dorsal shield carrying the tubercles ii of each side; a lateral shield bears i and iii, which are closely approximated; on joint 12, tubercle ii is a little dorsad to i; on the central segments i and ii are in line, iv + v; on the thorax ia + ib, iia + iib, iv + v. The enlarged tubercles iib of 3 and iii of 12 have the hair in a large, clear space around which the tubercle shield forms a ring; these hairs must be specially movable. Setæ rather long, brown. Spiracles brown, those of joint 12 larger than the others. Anal feet with a brown leg shield.

The following paper, by Mr. Banks, was then read by title:

SECONDARY SEXUAL CHARACTERS IN SPIDERS.

By Nathan Banks.

That differences in size exist between the sexes of spiders has long been known, and often commented upon. Yet it does not apply to all spiders; with the Theraphosidæ, Pholcidæ, Dysderidæ, Drassidæ, Clubionidæ, Agalenidæ and Dictynidæ there is little difference in size between the sexes. Usually the abdomen of the male is more slender than that of the female, but the cephalothorax is about as large. In the Agalenidæ the male is frequently larger and stouter than the female. In many Theri-

diidæ (micro-theridiidæ) there is little difference in size between the sexes. In the Epeiridæ and Theridinæ the male is commonly smaller, often very much smaller; in the Oxyopidæ and Lycosidæ there is not much difference in size, and with the Attidæ the males are never much smaller than the females. In the male sex of Thomisidæ, Epeiridæ, some Theridiidæ, and a few Clubionidæ the legs are proportionally or actually longer than in the female.

The difference in coloration between the sexes of many Attidæ has been dwelt upon by Prof. Peckham. It is far more prominent in this family than elsewhere in spiders. The Thomisidæ often show slight differences, and they are, in a few cases, I think, due to sexual selection. In at least one species (*Xysticus triguttatus*) there are two forms of the male, one colored as the female, the other, and much more common form, marked in a different manner. In the Oxyopidæ, *Oxyopes salticus* shows a very marked difference in the color of the sexes. In the Lycosidæ there are few cases, none very prominent. The male of *Lycosa ocreata* has the tibia I clothed with long, black, erect hair, which might well be considered as an ornament. In several species of *Pardosa* the male is very much darker than the female. In some Theridiidæ certain parts are more brightly colored in the male sex. In *Latrodectes* the male is much marked, and resembles the young of both sexes. In a few species of *Dictyna* the male is of a different color from the female.

The secondary structural characters in spiders are perhaps more interesting and less understood. I know of no case in either the Thomisidæ or the Lycosidæ. In the Attidæ we quite frequently notice that the mandibles of the male are much longer and larger than in the female, as *Zygoballus*, *Philæus*, *Epiblemum scenicum*, and *Icius mitratus*. In the males of some species of *Habrocestum* there are small projections on the tips of the patellæ and tibiæ of the third pair of legs. These projections are sometimes prominently colored, and are probably for ornament. In the Tetragnathidæ the mandibles of the male are usually larger and furnished with more teeth than in the female. Yet in the female they are much elongated. It is probable that this character is partly due to the general lengthening of all parts of the body, and later was especially modified in the male. But not all long and slender spiders have elongate mandibles; as in *Hyctia* and *Tibellus* they are of usual size.

In the Epeiridæ we notice that in the males of some species the tibiæ of the second pair of legs are thickened, and thickly clothed with stout spines, while the metatarsi are curved; for example in *E. trivittata*, *E. foliata*, etc. Sometimes the tibia bears a curved projection as in *Mahadeva*. These characters may be of some use in holding the female and preventing her from turning and biting the male. In the males of a few species

there are spines on the anterior coxæ, as in *E. solitaria*, *E. angulata*, and *E. silvatica*. These species also have the tibia and metatarus of leg II modified as above. Similar projections on the coxæ will be noticed in some Clubionidæ. In those Epeirids that have humps or spines on the abdomen the male sex is almost destitute of such characters. The head of male Epeirids is nearly always narrower than that of the female.

In the Theridiidæ there are a large number of differences in the sexes. In *Microdipœna* there is a curved, spine-like projection at the tips of the anterior tibiæ and metatarsi. A similar structure is found in some tarantulas. The head of the male of this genus is much higher than in the female; this is a very common difference in the family. In *Theridium frondeum* and one or two allied species there is a small hump at the base of the mandibles in the male. The mandibles are elongate and toothed in the male of *Theridium sexpunctatum*, and in certain species of *Linyphia* and *Erigone*. In the males of some species of *Tmeticus* and *Microneta* there is a spine on the front of each mandible. In *T. tridentata* there is a row of teeth on the sides of the mandibles, and in the female these are present in a rudimentary condition. In some species of *Erigone* the sides of the thorax in the male are spiny. In a number of micro-therididæ (*Lophocarenum*, some *Ceratinella*, etc.) the head of the male is curiously modified; elevated into humps of various shapes, and in the former genus with a little hole on each side. In the male of *Tmeticus unicornis* there is a prominent projection on the clypeus; a similar one exists in the male of *Histiagonia rostrata*. In the latter and in the allied *Ancylorrhanis hirsuta* there is a corneus shield on the abdomen of the male. In *Ceratinella* the males possess a similar shield above and sometimes also below; in some species it may be present in the female. In *Cornicularia* there is a horn between the eyes of the male. In *Erigonoplus* the male has the metatarsus of the front legs greatly swollen; this genus has the head lobed as in *Lophocarenum*. In the male of *Maso* the head is much broader than in the female.

The importance of the sexual peculiarities of the micro-therididæ is not understood. Though they are not ornamental in our eyes, they serve to give a distinctness to the male which may be of service in enabling the female to recognize her proper male; for except in these secondary sexual characters and in the genitalia (accessory) the species are much alike. In *Asagena* the cephalothorax is rougher in the male than in the female, and it is said that these spiders make a noise by rubbing the base of the abdomen over the cephalothorax, but it has not been observed in the American species. In this genus the second pair of legs is very spiny in the male.

In the Agalenidæ two species of *Hahnia* have the hairs on the

anterior legs of the male elevated on little projections. In the Dictynidæ the males of *Dictyna* have the mandibles longer than the female, and bowed. In the Clubionidæ a few species of *Clubiona* have ridges on the edge of the mandibles of the male. In three species of *Gayenna* (*G. calcarata*, *fraterna*, and *pectorosa*) there are spines on the posterior coxæ; these are possibly of use in holding the female. In *Thargalia* several species have horny shields at the base of the abdomen in the male. In the Drassidæ several species also have a horny shield at the base of abdomen of the male.

In the Dysderidæ the anterior metatarsi of the male *Ariadne bicolor* are curved and have a spine on each side. In *Plectrurys* may be noticed a hook-like process on the anterior tibia of the male, and the males of *Eurypelma* (Theraphosidæ) also have a curved hook at the same place. These projections are probably of use in holding the female. The mandibles of the male of *Psilochorus pullulus* (Pholcidæ) have each a spine on the front; the same are found in *Pholcophora americana;* in the latter species there is also a hump on each anterior corner of the sternum. In *Physocylus gibbosus* it is the female that is modified, the hinder part of the cephalothorax is elevated behind into a spine. The cephalothorax of the male is flat as usual in the genus. These various projections on the mandibles of the Pholcidæ are probably of no use in fighting, and probably not ornamental.

When one considers that each of these species has several allied species that exhibit no sexual structural peculiarities, it is difficult to explain the cause of these structures. Many cannot be used in fighting. Some Attidæ, as *Zygoballus*, are known to fight; but there are other Attidæ that also fight, and show no sexual structural differences. A few of them may be ornamental.

However, one must draw largely upon his imagination to find any use for some of these structures.

I would rather suppose that it is a part of the male inheritance to be endowed with an intense nervous restlessness that sometimes finds an expression in extreme developments of color or structure. Sometimes these may be seized upon and maintained by sexual selection. And, again, although they are not useful, they may be maintained as outlets for the excessive vigor of the male.

This, I think, would be more plausible than that they are the results of accidental variation maintained by sexual selection.

—The next paper, "Notes on the Habits of two Cicindelidæ from Texas," by Mr. J. D. Mitchell, of Victoria, Texas, was presented by Mr. Schwarz, who made some introductory remarks

upon the personality of Mr. Mitchell, and the keenness and reliability of his observations. Mr. Mitchell, he said, was an ardent naturalist, and had accumulated a large amount of valuable information from his studies of nature. None of these observations, however, had been written out, and Mr. Schwarz, when in Texas last winter, persuaded him to put some of his notes in the form of a paper. Mr. Mitchell complied with his request, and this paper was accordingly presented to the Society with Mr. Schwarz's recommendation that it be published.

OBSERVATIONS ON THE HABITS OF TWO CICINDELIDÆ.

By J. D. Mitchell.

1. Tetracha carolina.

In the daytime the males hide under logs, trash piles, dead leaves or bunches of grass; the females dig for themselves a den just large enough to turn around in, in some well-drained place, always using a weed leaf or grass blade to hide the opening. When they come out in the evening, they hurry to the water's edge, and thrusting their mandibles deep into the moisture, take a long drink. Then they begin their search for food; they run fast, but erratic in course; they are very shy. I have never been able to make one eat in captivity. I have observed them capture insects many times, but could not identify the insects captured.

The sexual season is continuous from June to frost. The female avoids the male, running, dodging and hiding when pursued by a male. She seldom accepts sexual service without a struggle. The male seizes the female with his powerful pincers, at the junction of the thorax and abdomen, and forces matters with her. The act consists of one insertion of the penis, lasting about two minutes—sometimes the male holds on for a second insertion, but that is the exception. The female deposits her eggs always near fresh water, one in a place, a quarter or half inch below the surface of the ground and always in some well drained spot. The young larva digs a hole an inch and a half or two inches deep, and open at the top, bringing the earth in small pellets to the surface in its strong pincers and depositing them as far from the opening as it can without leaving its hole. As the larva grows it digs its hole, larger and deeper, reaching a depth at maturity of twelve to eighteeen inches, according to soil. If an ant, sow-bug or like insect is dropped into their den, it is seized and eaten. I have never seen a larva leave its hole, but I have seen them reach half their length all around the opening. I have dug out full grown larvæ on the 20th day of January,

1902. By March their holes are open in every direction in large numbers.

The mature beetle is very shy and runs fast and hides effectively. They have good wings, but I could never induce one to fly in daytime. At night they will fly, but always crawl up on a stick or something to start from. If captured and placed in a bottle, a pair will copulate, so strong is this instinct. They are sometimes called by the natives the "white-eyed bug."

The above observations were made near Alligator Head, Calhoun County, Texas, in the years 1901 and 1902.

2. Cicindela rectilatera.

The beetles have but two objects in life—eating and propagation. They are omnivorous; they will eat algæ and the fine green moss that grows on moist ground around springs, pulling it loose and shaking it free of sand before chewing it up. They will also eat any small insect that they can capture such as small ants, very young fiddler crabs, marine fleas, etc. They will also eat any dead flesh that is fresh such as fish, rabbits, etc. I once skinned a large moccasin for them and in less than half a day I had a beautifully-cleaned skeleton; they will not eat carrion.

In midsummer they seek shade in the heat of the day; all the balance of the time, day and night, they spend moving about. They prefer the margins of the bays, rivers, lakes, and ponds, but I have seen them, apparently content, many miles from water. They run by spurts and fly promptly when danger threatens.

In the breeding season, which is from June to frost, the sexual desire seems to be entirely on the side of the male, and it is seldom that the female submits to the act without a struggle to prevent it. The male seizes her with his strong pincers between the thorax and the abdomen, and, will she, nil she, forces the matter. The act consists of from three to five insertions of the penis, according to the vigor of the male, each insertion lasting about one minute with a rest spell of about three minutes between insertions. So strong is this instinct in the male that he will perform it in a bottle held in the hands, and I have several times had them to die in the cyanide bottle without losing hold of the female. After the female has surrendered to the male, she goes about seeking food, carrying the male on her back. When the male releases the female, he makes a good run, for she turns on him and tries to bite him.

When ready to deposit her eggs, the female flies some distance from her haunts. I have found colonies of larvæ three and four hundred yards from where the nearest adults lived. She lays one egg in a place, but places them from one to six inches apart. As soon as the young larva hatches, it opens a hole to the sur-

face and digs downward, increasing its den in size and depth as it grows, until it reaches eight or ten inches deep. If a green grass stem is dropped into their hole they will seize it, when a quick jerk will place the larva above ground.

The above observations are from a lifetime of observation in Southern Texas.

Mr. Schwarz stated that Mr. Mitchell had presented a full-grown larva of *Tetracha carolina* to the National Museum which hitherto possessed only the larvæ of *T. virginica* and *T. euphratica*.

Mr. Currie reported that over thirty specimens of *Tetracha virginica* had been taken from the toilet room in the Smithsonian building last summer. They had no doubt been attracted thither by the light at night and had been unable to get out. He thought they must breed somewhere in the vicinity. Mr. Schwarz thought that they could hardly breed nearer than the Potomac river or the carp ponds of the Fish Commission, as they required damp places for this purpose. Mr. Marlatt said he had collected large numbers of *Tetracha carolina* in the daytime in Kansas under clods of earth on plowed ground. The only water near was a small pond.

—Mr. Schwarz then remarked upon the occurence of *Cicindela striga* in Florida. The first specimens were found by Hubbard and Schwarz, attracted by the light of the camp fires at Lake Harney and Enterprise. In 1894 a third locality was discovered in the vicinity of Punta Gorda. Here *C. striga* and *C. severa* were seen on July 14th flying ahout during the noon hours on a meadow-like opening in the pine woods close to the shore of the bay. At the suggestion of Mr. Hubbard the place was visited during a severe rain storm, when the meadow was under water, excepting a few small hillocks. It was then found that the Cicindelas had taken refuge under fallen leaves beneath the small bushes growing on the hillocks. With a little strategy specimens were then easily secured.

—Mr. Schwarz said there was a commonly-prevailing belief, discredited by naturalists, that centipedes would leave a streak in their path wherever they crawled over a person's body; in other words, that the claws of their feet would cause a poison-

ous inflammation wherever they touched the flesh. Mr. Mitchell, of Victoria, Tex., told him of a case which came under his observation. A man discovered a centipede crawling over his back beneath his shirt. He endeavored to capture and remove it but had some trouble in doing so. When the man's back was examined a streak, which afterwards turned blue, was found where the creature had crawled. The man was sick for some time but finally recovered. Mr. Schwarz said that if this had been reported to him by anyone not a reliable observer he would not have believed it. He thought that the injury was inflicted after the centipede had been irritated by the man's effort to capture it. Dr. Howard said that the only poison glands known in the centipede were situated at the base of the maxillipeds.

—Mr. Marlatt then read the following paper:

COLLECTING NOTES ON MOSQUITOES IN ORIENTAL COUNTRIES.

By C. L. Marlatt.

In the progress of a trip made by the writer from San Francisco to Honolulu, Japan, China, Java, Ceylon, Egypt, and home again via France, special effort was made to collect the mosquitoes which were in evidence in hotels and inns stopped at. The trip covered over a year (1901–'02), six months of which were spent in Japan, and shorter times in the other places enumerated. The main object of the trip being the collection and study of insects of other kinds, no special effort was made to collect mosquitoes in the open nor otherwise than as stated. The notes, therefore, are practically an account of the different kinds of mosquitoes which were found in the cities and towns visited, and notably those liable to attack travelers and guests at the different hotels and inns. An examination of the records indicates that the house mosquito in greatest abundance and most widespread is the *Culex pipiens* Linné. This mosquito occurred practically everywhere, and was the species which was most in evidence in point of numbers. It certainly deserves the title of being the world mosquito as an indoor pest. Species of Anopheles were not very often met with, and, on the other hand, were several times found in places where they would not have been expected, or, in other words, where malaria is practically unknown. The writer was bitten frequently by all the species of mosquitoes collected, and many of those collected were taken in the morning charged with blood. No results of any very serious consequences followed any of the bites of mosquitoes. Ano-

pheles included. In certain very malarious districts this doubtless is to be ascribed more to good fortune than anything else. All of the material was examined and determined by Mr. Coquillett who furnished notes also on distribution.

Leaving San Francisco in winter, it was a rather odd experience to have the mosquito problem thrust forcibly on one's attention in the Hawaiian Islands in early March. On the hotel verandas and in the hotel dining-rooms and bedrooms in Honolulu at this season of the year (March 14th to 21st) mosquitoes were very abundant and very pestiferous, it being almost impossible to avoid being bitten many times during the evening and night. The most abundant species collected here was *Culex pipiens*. About the city of Honolulu the Chinese and Japanese farmers are actively engaged in the growth of rice after the system followed in their respective countries, and the flooded rice fields and irrigating ditches furnished ample means for the breeding in abundance of the mosquitoes, which characterized the place and season.

The Mosquitoes of Japan.

Japan was reached the first of April, and explorations throughout the islands, from the north island (Hokaido), in the latitude of Maine and Nova Scotia, to the lower end of the southern large island of Kyushu, the latitude of St. Augustine, was prosecuted from the date of landing until the date of departure, September 22d.

Japan is an ideal country for mosquitoes. The great staple crop and the main food of the Japanese is rice, and rice fields cover every inch of the country which can be reduced to a level and brought under water. For several months in the year, therefore, much of Japan is a shallow water pool, and the country is filled with the irrigating ditches and canals which supply water to the rice fields. The very slight use of beasts of burden, also, has led to the cutting up of the larger cities and towns with canals, by means of which the products of the country are brought to every section of the city. These canals forming a network through the cities are choice breeding places for mosquitoes, and the result is that when the mosquito season comes around the mosquito nuisance is perhaps greater in Japan than any other country in the world; at least the writer has never seen mosquitoes so abundant as in some of the Japanese inns. Furthermore, every Japanese establishment of any pretensions has its little garden with everything in miniature, and including among the rest two or three little lakes fed by streams of running water, very greatly adding to the picturesqueness of the surroundings, but affording at the same time exceptional breeding places for different mosqui-

toes. Another feature in the economy of the Japanese house is the numerous washbowls, crockery or stone, set up by the side of the houses so that the guest can step out on the little porches and wash his hands and face in the open. These stone or crockery washbowls are of considerable size, holding several gallons of water, and are kept replenished all the time, and mosquitoes breed in them in considerable numbers.

The common mosquito of Japan is *Culex pipiens*, and this species was really the only one that occurred in any special numbers and everywhere. Anopheles was found only once in Japan, and then a species (*A. sinensis* Wied.) previously known only from China. Japan is notably free from malaria in spite of the fact that the Japanese live half their time in water in the rice fields and the abominable condition of the city canals and waterways. This fact is very good confirmatory evidence of the necessity of the Anopheles as a means of conveying this disease.

The mosquito season begins in Southern Japan early in May. In April no mosquitoes were noticed. The worst period for mosquitoes seems to be June, in my own experience, but the mosquito pest continues, with very little decrease, throughout the summer. The rainy season, with its daily rains and excessive heat and humidity, may have the effect of somewhat restricting the multiplication of the mosquitoes, causing a slight abatement of the nuisance in the latter part of June and July.

The mosquito pest in Japan would be unendurable were it not for the very effective mosquito net which is put up in the little Japanese bed room at night. This net ("kaya," from Ka, mosquito) consists of a great square tent of strong green netting, the color being very restful to the eyes. When one is ready to retire for the night, the mattress bed having already been made up on the floor, the mosquito tent is produced and dropped as a big bundle on the middle of the floor. Strong cords run from each of the four corners of the tent and connect with hooks in the corners of the room. One corner after another is pulled out and hooked up high on the walls, so that when all the corners are adjusted the tent is raised from the floor, except a lapping of three or four feet of cloth, and you have a tented room within the room proper nearly as large as the room itself. By this method of lifting the kaya from the floor every mosquito is excluded, and throughout the six months' experience in Japan wherever the kaya was used not a mosquito bite was inflicted during the night. The kaya has the advantage also of being very large and roomy, and does not give the shut-in sensation which one gets from little mosquito nets, fitting closely, as they commonly do, to the bed. One can have a table and write or study within these nets, and be perfectly safe from the myriad of mosquitoes which are swarming outside. In getting within the

kaya one goes on all fours, and the little Japanese maid stands close by with a fan which she waves vigorously while the hasty scramble is made under the edge of the net.

The Japanese house is a mere framework of heavy timbers. The outer wooden walls (amados) are removable in sections, and within these are the paper walls (shoji) which may also be removed, or slide together, leaving the rooms absolutely open to the air and light. The result is that mosquitoes have free access to Japanese houses nntil the retiring hour, when the shoji are slid back, and the amados are replaced, closing the house up very tightly unless vigorous protest is made in the interests of air and to prevent partial asphyxiation. Very fortunately while the rooms are lighted the mosquito is not often troublesome in Japan (and I refer now more particularly to *Culex pipiens*). This, however, is by no means an absolute condition, and one will be bitten often enough even if 99 per cent. of the mosquitoes are inactive in the presence of light. This is in marked contrast to the behavior of the mosquitoes of Singapore and Java, which bite quite as readily at night in partially lighted rooms as in the dark.

The general notes which follow are arranged by localities.

Okayama, *Japan*, *May 4th.*—The inn at this place where two nights were spent faced a swamp in which grew the sedge or reed, used as a covering for Japanese house mats. The hotel was infested with a very large mosquito, evidently an Anopheles, with distinctly spotted wings, and so vicious was this insect that it was impossible to avoid being bitten many times during our late dinner and before refuge was taken beneath the "kaya." It was also exceptionally active, and the greatest difficulty was experienced in capturing a few specimens. This mosquito, determined by Mr. Coquillett as *Anopheles sinensis* Wied., was the only Anopheles found in Japan. It was originally described from China, and has not heretofore been reported outside of that country and is new to the National collection. *Culex pipiens* also occurred here in moderate numbers.

Takamatsu, *Japan*, *June* 3.—At no place in Japan were mosquitoes seen in greater numbers than here. They occurred simply by myriads, the walls of the rooms being blackened by the numbers resting there. They bred in the numerous canals intersecting the city. They were the species *Culex pipiens* Linné, and were rather sluggish in light, and collecting bottles could be put over them without their making any attempt at flight.

Kotohira, *Japan*, *June* 4.—In this small interior town but few mosquitoes were found, apparently of the same species that occurred at Takamatsu. These two localities are both on the island of Shikoku, an island out of the line of ordinary travel.

Gifu, Japan.—The first stop at Gifu was early in May, and mosquitoes had not put in an appearance. On the return to this town, June 17th to 20th, the mosquitoes were present in enormous numbers, the common species evidently being the *Culex pipiens*, although the specimens collected, which were a good many, were lost in the mails. In Japanese rooms there are numerous little closets with sliding doors in which the bedding and other paraphernalia are kept out of sight, and on opening these little cupboards one would find them in the daytime simply crowded with mosquitoes, and in all the smaller closets and dark rooms the mosquitoes collected in enormous numbers. In the daytime these mosquitoes were not at all in evidence, except when disturbed in their retreats, and mosquito attacks in the daytime were practically unknown.

Nagoya, Japan.—Nagoya, one of the largest cities of Japan, is on low ground and much cut up by canals, and mosquitoes were in evidence in astonishing swarms. The inn at which we put up was a semi-European one, and the beds had the small European mosquito nets, the lower edges of which were carefully tucked under the mattress. In my own case, however, the sealing was not perfect, and some thirty mosquitoes filled up with my blood at regular intervals during the night. These I collected in the morning, and were all identified by Mr. Coquillett as *Culex pipiens*. They presented, however, in the effect of their bites, a marked contrast to all the experiences with this species before. The bite of this mosquito never produces any effect on me, and the point of puncture is not noticeable after the mosquito flies away; but in the case of the bites at Nagoya their punctures made a bright red point which remained in evidence for several weeks, turning ultimately brown. The feature of special interest at this place occurred early in the night when the writer was in a very sound sleep from the fatigue of a very long and hard day's work. In the course of the night my elbow was pushed against the mosquito net, and some time after I was awakened by a burning pain in that quarter of my anatomy. When I became fully awake I realized the cause of the trouble, and crouched more narrowly in the center of my meagre bed. An angry roar of mosquitoes massed at the particular spot where my elbow had been indicated an enormous swarm concentrated there, and did not abate for about an hour. In the morning there was a spot on my elbow the size of a silver dollar, bright red and filled with hundreds of punctures. Evidently as many as could do so had been biting at once, and numerous relays had had their turn. The spot changed from red to brown, and remained in evidence about three weeks. All of the specimens collected at this place proved to be *Culex pipiens*.

Yamada, Japan, June 22d to 24th.—The mosquito of this

district was also *Culex pipiens.* It occurred in very much less numbers than at Nagoya, but abundant enough to be a distinct nuisance. Its bite here had even a more inflammatory effect than at Nagoya, producing very large red *blotches*, which persisted for days. At Nagoya the bite produced merely a small red spot or point. With the exception of these two localities no inflammatory effect from the puncture of this mosquito was especially noted.

Yokohama and Tokio, Japan, June 26th to July 15th.—Mosquitoes in this region, the low country surrounding the bay of Owari, were not very abundant; in other words, while they occurred scatteringly in the rooms every night, they did not appear in the great swarms which had been seen farther south. The only species secured was the *Culex pipiens*, which in Yokohama was comparatively rare, but rather more abundant in Tokio, doubtless on account of the greater numbers of canals in the latter place.

Sapporo, Japan, August 18th to 22d.—This was the most northern point reached in the Japanese Empire, having the latitude of Nova Scotia. The mosquitoes collected were *Culex pipiens*, and a species of Culex undetermined They were fairly abundant. The same species occurred at Aomori, and at all the other stops made in North Japan.

Sendai, Japan, August 28th and 29th.—This town is halfway between Tokio and Aomori. *Culex pipiens* was the common and abundant species. Another species of Culex (*Culex concolor* Desv.) also occurred here, but more rarely.

The elevated mountain regions of Central Japan in the neighborhood of Nikko in which the latter part of July and the first August were spent were not characterized by mosquitoes; at least no mosquitoes were noted in the various inns stopped at. This elevated mountain region is very moist, rains occurring daily, and the streams characterized naturally by very rapid currents. It should be further noted that in the southern island of Kiushu, which was explored during the month of May, no special nuisance of mosquitoes was experienced and no collections were made. The district in which the mosquitoes were most abundant in Japan was the southern coast of the main island in the Ise province, and on the island of Shikoku lying immediately to the south of the main island. They were much in evidence but less abundant along the eastern coast of the main island of Japan northward to and including the island of Hokkaido.

The Mosquitoes of China.

In the experience of the writer China cannot be called very much of a mosquito-ridden country. This experience can hardly be charged altogether to the season of the year of the visit, which

covered the time between September 26th and November 14th; or, in other words, the early fall, which is usually a very prolific mosquito period. Furthermore, malaria is much more feared in China than in Japan, which would indicate a greater prevalence of the species of the genus Anopheles. The exploration of China extended from the region north of Pekin southward to Hong Kong. At no place visited were mosquitoes at all abundant, and only a few individuals were captured. The conditions in China are very similar to those in Japan, namely, a great deal of the country from the center southward is devoted to the culture of rice, and there are always more or less of canals leading through and around the cities. The cities proper, however, are not broken up by canals as completely as they are in Japan. The highways of China are canals instead of roads, and the products of the country are taken along these canals in the peculiar Chinese junks or scows, and travel in the interior is necessarily, for the most part, in boats on these canals. In that way the writer made a trip into the region west of Shanghai in a house-boat, going through many miles of these country canals, and part of the way through the grand canal which connects Pekin in the far north with the ocean at the southern part of Hang-chow. The conditions, therefore, were favorable enough for an abundance of mosquitoes, and their absence was rather remarkable, under the circumstances. The mosquitoes collected in and about Shanghai in Central China and at Tientsin, and Pekin in north China, were *Culex pipiens* Linné. On the house-boat trip into the interior west of Shanghai where one was living all the time on the water of the little canals, for the most part with scarcely any current, the mosquitoes were only noticeably bad at one place, namely, Haining, and we were much bitten during the nights spent there. In fact, no mosquitoes were observed elsewhere on this trip. The house-boat was open, and most of the mosquitoes at Haining escaped at daylight, and only a few were captured. These represented two species, *Anopheles sinensis vanus* Walker, a species originally described from Celebes and reported by Theobald from the Malay Peninsula and India, and represented further in the National collection by specimens from the Philippines. This Anopheles is the one that was the greatest pest at this point. The other species was Mr. Coquillett's *Culex subalbatus*, which was originally described from Japan, and has not hitherto been reported outside of that country.

A stop of several days was made at Singapore, British Straits Settlements, Malay Peninsula, and we were very much annoyed all the time, day and night, by the persistent attacks of mosquitoes. The most troublesome of the mosquitoes was the very prettily marked little Stegomyia (*Stegomyia fasciata* Fab.), originally described from the West Indies, but occurring over

the warmer parts of the world, and now notorious as the agent for conveying the yellow fever parasite. This little black mosquito is active in the daytime, making its attack and escape very quickly; in fact, it was some time before a specimen could be detected in the act, the least movement causing the insect to dart away. It manifested a very notable tendency to fly up under the edge of the trousers, biting through the stockings, or on the wrists under the sleeves, and very rarely alighted on the bare hands or face. A sudden and intense itching was the first indication of the presence of the pest, and this itching continued, causing great annoyance, for about two hours, and then slowly disappeared. This little species resembles very much an Anopheles, having spotted wings and resting in the same oblique position on walls. It was the great mosquito pest of this region, and was found later in considerable numbers in Java and in Ceylon. A greater variety of mosquitoes were found at Singapore than at any point previously visited, as indicated by the accompanying list:

Anopheles rossii Giles.
Culex pipiens Linné.
Culex vishnui Theobald.
Stegomyia fasciata Fabr.
Stegomyia scutellaris Walker.

Of the second species of Stegomyia (*S. scutellaris*), but one specimen was secured. This species was originally described from the Aru Island, and Theobald reports it as occurring from Japan to the Fiji Islands, and westward to Mauritius.

The Mosquitoes of Java.

The mosquito problem in Java is a rather serious one. The island is devoted, like Japan, to the culture of rice; and, furthermore, there is a great deal of low, swampy country near the coast where malaria has always been a grievous scourge, so much so that it has been necessary to establish large convalescent stations in the mountains to which the soldiers are regularly transferred after a period of service in the low country. Through the chance meeting in Japan, with some longtime Dutch residents of Java, some idea of the conditions in this island was obtained, and letters of introduction were secured to the army medical service, which, in the last few years, has been very much interested in the mosquito problem in its relation to malaria. Doctor Koch, of Berlin, spent some time on the island, about two years before my visit, studying and collecting mosquitoes, and had aroused very wide interest in the subject. Shortly after my arrival at Batavia, I called with the American Consul, Mr. Rairden, on the chief medical officer of the army, Doctor Fruitog,

who introduced me to his assistants charged with the laboratory experiments on mosquitoes. The work being done is of a very thorough and practical sort, mainly directed, so far, to the study and identification of mosquitoes of Java, and getting information on their breeding habits and distribution. I was informed that a species of the genus Anopheles occurred pretty generally throughout the island, and my subsequent experience confirmed this statement.

Some three localities in Java are especially noted as being very much subject to malaria. These are the lower city of Batavia, and especially the landing-wharf, Priok; Tjilatjap, a low, marshy coast region on the south side of the island, which has the worst record of all for malaria, and an interior district, Ambabuwa, situated somewhat inland from Samareng. Elsewhere in Java the Anopheles does not seem to be especially associated with malaria. The Anopheles of Java is *A. rossii*, and was collected by me in nearly all of the main points at which any stop was made. Curiously enough, this species was found both at Soekaboemi and at Sindanglaja, the two mountain resorts with convalescent stations where soldiers and the Dutch residents suffering from malaria are sent to recover. In both of these regions, therefore, malarial patients must often be bitten by mosquitoes and by this Anopheles, and yet new cases of malaria are practically unknown in these places! I was assured of this state of affairs, which is somewhat astonishing, by Doctor Fruitog and some of the other surgeons in the army service, whom I have to thank for courtesies in giving information and for the collection of some specimens from Batavia and Priok.

At Batavia malaria is more or less common, and the Anopheles also, although the mosquitoes most in evidence there were *pipiens* and other species of Culex. At Buitenzorg and Garoet the Anopheles occurred in considerable abundance. Both places have a fairly high elevation, and malaria is very little feared, the only cases appearing being those introduced from other districts. All the places stopped at in the interior of Java were fairly elevated ones, with the exception of Batavia and Maos, which latter is on the edge of the notorious Tjilatjap district. At Maos a great many mosquitoes were collected, but some of the lots were lost, and the only ones shown in the list determined by Mr. Coquillett are *Culex pipiens*, *Culex vishnui*, and *Culex tenax* Theobald, the latter being the abundant species. My own recollection is very distinct of two species of Anopheles, one of which was a very minute species, the smallest I have ever seen, and of a light ash-gray color. I regret the loss of these specimens. The list of mosquitoes collected in Java follows. Weltevreden, it may be said in explanation, is the upper city of Batavia, and considered to be much more free from malaria than the old town:

BATAVIA:

Anopheles rossii Giles. This species was originally described from India, and is reported by Theobald from the Malay Peninsula. The National Museum collection contains specimens from Ceylon and the Philippines. It is the common Anopheles from India eastward through the Malay Peninsula and the East Indies.

Culex pipiens Linné.

Culex gelidus Theobald, described from the Malay Peninsula.

Culex concolor Desv. The type locality of this species is unknown. Theobald reports it from the Malay Peninsula, Burmah, China, and India, and the National Museum contains collections from Ceylon, and one specimen of it was obtained by the writer at Sendai, in North Japan.

Stegomyia fasciata Fabr.

WELTEVREDEN:

Anopheles rossii Giles.

Culex pipiens Linné.

Culex tenax Theobald. This species occurs throughout Java and is one of the most abundant species, second only, perhaps, to *pipiens* as a house pest, occurring both in the low coast country, in the mountains, and on the elevated plain of East Java. It was originally described from the Malay Peninsula, and has not hitherto been reported elsewhere.

Culex vishnui Theobald. This species had been previously collected at Singapore, and was taken from three widely separated localities in Java. It was described from India and Ceylon, and the National Museum contains specimens from the latter locality.

BUITENZORG:

Anopheles rossii Giles.

Culex pipiens Linné.

SINDANGLAIYA:

Culex pipiens Linné.

Anopheles rossii Giles.

GAROET:

Anopheles rossii Giles.

Culex pipiens Linné.

Culex tenax Theobald.

Culex vishnui Theobald.

Tæniorhynchus ager Giles. Found also at Solo, east Java; was described from India and not hitherto reported outside of that country.

Stegomyia fasciata Fabr.

MAOS:
Culex pipiens Linné.
Culex vishnui Theobald.
Culex tenax Theobald.

SOLO:
Anopheles rossii Giles.
Tæniorhynchus ager Giles.
Culex tenax Theobald.

BANDOING:
Culex pipiens Linné.

SOEKABOEMI:
Anopheles rossii Giles.
Culex pipiens Linné.
Stegomyia fasciata Fabr.

Taken as a whole, the mosquitoes were not a very great nuisance in Java during the time the writer spent there, namely, the month of December. The rainy season was just beginning, and the conditions were favorable for the mosquitoes, and they were everywhere in evidence and annoying, but not occurring in the enormous swarms witnessed in Japan, except, perhaps, at Maos.

THE MOSQUITOES OF CEYLON.

En route home a six weeks' stop was made in the island of Ceylon. Most of this time was spent in the higher mountain regions in the central portion of the island, notably at Kandy and Newara Eliya. At Colombo on the coast no mosquitoes were collected, and they were not in evidence in the hotel. The species collected in Kandy by me were *Culex pipiens* and probably the two species of Stegomyia. *S. scutellaris* was certainly abundant, and possibly some of the specimens represented *S. pseudotæniatus* Giles. The Stegomyia is the great outdoor pest in the mountain country, biting in the daytime and proving to be a very great nuisance while collecting in the woods. In Newara Eliya occurred the Stegomyia, and also in the hotels *Culex vagans* Wied. and *Culex mimeticus* Noe. *C. vagans* was originally described from China, and has not hitherto been reported from any other region. It was comparatively abundant. *C. mimeticus* was originally described from Italy, and is reported by Theobald from Palestine, India, and the Malay Peninsula. But one specimen was taken.

The mosquitoes of Ceylon have been carefully studied by that eminent entomologist, Mr. E. E. Green, who reports the occurrence on the island of twenty-one species, including several Anopheles. A list of the mosquitoes of Ceylon is appended.

Those starred were presented to me by Mr. Green for our National Museum collection. It will be noted that *Culex vagans* and *C. pipiens* are not included in Green's list.

Aedeomyia squamipennis Arrib.
**Anopheles barbirostris* Wulp.
* " *fuliginosus* Giles.
* " *maculata* Theobald.
* " *rossii* Giles.
**Armigeres obturbans* Walker.
" *ventralis* Wlk.
**Culex concolor* Desv.
" *fatigans* Wied.
" *gelidus* var. *cuncatus* Theobald.
" *impellens* Walk.
" *mimeticus* Noe.
" *singalesi* n. sp.
* " *vishnui* Theobald.
Mucidus scataphagoides Theobald.
Panoplites africanus Theobald.
" *uniformis* Theobald.
Stegomyia pseudotæniatus Giles.
* " *scutellaris* Walker.
**Tæniorhynchus ager* Giles.
Toxorhynchites immisericors Walker.

The subject of the mosquitoes of Ceylon in their relation to malaria is covered in a publication by Mr. Green, issued by the Royal Botanic Gardens, Ceylon, Series 1, No. 25, December, 1901. One item only may be noted from this communication, namely, that Mr. Green estimates at least 25,000 deaths to have been due to malaria in the year 1899. From this some idea may be formed of the number of cases of malaria, comparatively few of the cases resulting fatally. In one instance out of 600 coolies employed in railway construction half of them contracted malarial fever within a month and were compelled to give up work. The Anopheles that seems to be responsible for malaria in Ceylon is *A. rossii*, the species which was the subject of the early studies in India leading to the discovery of the true cycle of the malarial parasite.

The mosquitoes collected in Egypt and France in February and March on the homeward trip all proved to be *Culex pipiens* Linné. They were not specially abundant in Luxor, Cairo or Port Said where they were collected, nor in Mentone, France, where additional specimens were secured.

Reviewing the above, it will be noted, as indicated at the outset, that *Culex pipiens* Linné is the common house species in nearly every part of the world visited. It was collected from below the equator, northward to a latitude of Newfoundland,

and seems to be equally at home and abundant in all climes. It is undoubtedly *the* domestic mosquito pest of the world.

The paper was illustrated by plain and colored photographs taken principally in Japan and China, showing the character of the country visited and various objects and places of interest.

June 5, 1902.

The 170th regular meeting of the Entomological Society of Washington was held at the residence of Mr. C. L. Marlatt, 1440 Massachusetts avenue N.W. The chair was occupied by the President, Dr. Dyar, and there were also present Messrs. Kotinsky, Quaintance, Marlatt, Ashmead, Motter, Patten, Gill, Currie, Benton, Heidemann, and Waite.

Mr. Quaintance reported that he had observed the Periodical Cicada (*Cicada septendecim*) feeding quite generally upon apple, maple, ash, and Carolina poplar. He exhibited microscopic slides showing the seta from the proboscis of the cicada imbedded in the bark. He had seen these insects feeding that same morning, and had noticed that the plant juices exuded when the beak was withdrawn. Dr. Gill doubted whether the operation observed by Mr. Quaintance could be strictly termed *feeding*, as the intestinal canal of adult cicadas was known to be aborted. Mr. Marlatt said that cicadas had not hitherto been definitely shown to feed in the ordinary sense of swallowing and assimilating food. He thought that the process could not be anything more than a tasting of the plant juices, and believed with Dr. Gill that the atrophied alimentary canal precluded the possibility of normal assimilation. He stated that a colorless liquid was exuded from the anal canal.

Dr. Gill mentioned an early published reference to the Periodical Cicada by one Peter Collinson, a correspondent of Linnæus, who gave the interval between their appearances as fourteen or fifteen years instead of seventeen. The figure published with this reference resembles *tibicen* more than *septendecim*.

—Mr. Marlatt read the following papers on the Periodical Cicada:

NOTES ON THE PERIODICAL CICADA IN THE DISTRICT OF COLUMBIA IN 1902.

By C. L. Marlatt.

The holes of the periodical cicada began to be brought to the surface in numbers by the first of April, and the area under trees in the grounds of the Department of Agriculture, and of the Smithsonian Institution, was quite thickly studded with holes during the first week in April. The adults, however, did not begin to emerge until the second week of May, a few stragglers appearing at first, but from the 10th onward emergence became rather general. Within the city very few of the cicadas which came out survived more than a few hours, being quickly snapped up and destroyed by the English Sparrow. The numbers within the city were greatly diminished by the English Sparrow at the appearance 17 years ago, the destruction by this bird at that time having been noted by Prof. Riley and others to be very considerable. The sparrows' work this year, however, was much more effective, the cicadas being fewer in numbers; and I doubt whether a single individual, certainly very few, ever reached the egg laying period. For two or three days in the midst of the trees on the Museum grounds a few song notes were heard, but ceased very soon. In the woods in the country about the city, especially out toward Chevy Chase, the cicada appeared in very considerable numbers, and here did not suffer very much from the attacks of birds, and for the most part went through the normal aerial existence successfully. The emergence was a prolonged one, and instead of being fairly complete in a few nights, as has sometimes been described, new cicadas were coming out in considerable numbers three or even four weeks after the first appearance. This was especially noticeable on the grounds of the Chevy Chase Club, where the insect appeared in perhaps greater numbers than at any other point observed.

Another thing noted by many observers in the District, and also frequently by the writer, was that very many of the cicadas failed to free themselves from their pupal shells, and either died in the shells or went about for a day or two with the shell clinging to the abdomen, preventing the wings from expanding. The reason of the extraordinary number of failures to transform successfully does not readily suggest itself. It is possible that the very cold and late spring may have had something to do with it.

Egg-laying began about June first, and continued with considerable activity until the middle of June, and by scattering individuals even later. The egg-laying in the woods about Washington, especially on the higher grounds, was of sufficient amount

to kill the terminal branches of the trees, in some cases almost all the branches dying, and many branches were broken off by the winds. They seemed to have a preference for small trees, and on young oaks and hickories the outer limbs were almost all killed back. This preference for small trees is probably due to their flying low, or perhaps liking to get out into the sun, but it possibly may have as a basis an instinct which leads them to select a tree just starting in life as one which gives greater assurance of supplying the offspring with permanent subsistence. Trees bordering densely-wooded tracts were more oviposited in than in the interior of the woods.

During the first week or ten days of the emergence of the cicada, a very large percentage of the small variety *cassinii* were observed. These, however, according to my observations in the District, did not remain long in evidence, but soon disappeared. They occurred in about equal proportion of both sexes, and mated.

The different song notes of the cicada were more noticeable with this brood than has been my experience before in two other occurrences which I have witnessed. In other words, the three notes described by writers on the subject were all of them represented, and the two notes which are usually less common were perhaps in greater evidence than the common note made by this insect. In the case of another large brood witnessed by me, only the one note could be distinguished, viz, the song represented by the letters ts-e-e-e-e-e-e-e-e-e-e-ow, with the sound dying away. This year the broken and chipping notes were very shrill and loud, and very much in evidence, the chipping note being the characteristic one of the small variety.

Nowhere outdoors in the District were any evidences of the making of cicada cones reported. Mr. Wm. Tindall, living on Washington Heights, at the northwest section of the city, discovered some of these curious structures in his woodshed, and an investigation of the premises developed the fact that this woodshed was studded with cicada cones of perfect construction, varying from an inch to six inches in height. Evidently a tree had stood about where the woodshed was built, and the cicadas had undergone their development successfully in the ground beneath. All of those coming to the surface outside of the shed escaped through simple holes without any structures above ground; but every individual which came up within the shed built a turret or cone. The ground floor of the shed was somewhat moist, rain running under, but it was rather dryer than the ground outside, so that the cones could not have been built on account of the moisture. The only explanation which seems to offer for these cones is that the pupæ coming up in the rather dark, poorly-lighted shed attempted to carry their holes

farther up to get into broad daylight. This is a mere conjecture, and possibly wide of the mark. Certainly the occurrence of cones in this particular spot does not answer the explanations which have been offered heretofore to account for these curious structures.

The cicadas disappeared, even in the woods outside the city, practically by about the 25th of June. Eggs were very abundant on the trees, and hatching did not begin to any extent before the 23d of July. A big transplanting of eggs was made from the surrounding forests of the District to the Department grounds, to afford material for studies in the development of the larvæ. The planting was made in the oak grove on the west side of the Department grounds, where similar experiments had formerly been in progress.

AN EARLY RECORD OF THE PERIODICAL CICADA.

By C. L. Marlatt.

The earliest published account of the periodical Cicada which has come under my own observation was brought to my attention by Prof. E. A. Andrews, of the Johns Hopkins University, Baltimore, Md. It is contained in Volume I, No. 8. p. 137, of the Philosophical Transactions of the Royal Society of London, published January 8, 1666. The portion of the communication relating to the Cicada is quoted below:

"Some Observations of Swarms of Strange Insects and the Mischiefs Done by Them.

"A great Observer, who hath lived long in *New England*, did, upon occasion, relate to a Friend of his in *London*, where he lately was, That some few years since there was such a Swarm of a certain sort of Insects in that *English* Colony, that for the space of 200 Miles they poisoned and destroyed all the Trees of the Country; there being found innumerable little holes in the ground, out of which those Insects broke forth in the form of *Maggots*, which turned into Flies that had a kind of tail or sting, which they stuck into the Tree, and thereby envenomed and killed it." * * *

The rest of the article referred to a plague of locusts (grasshoppers) in Russia, with which the Cicada is confused. The brood referred to here is very likely No. XIV, which appeared in 1651. No other brood coincides with this narrative and No. XIV not very closely, but as the quotation states the relation

was "upon occasion," and was "some few years since," there is ample warrant for assigning the account to the brood of 15 years before.

Prior to the discovery of the above record the earliest published account known was that referred to in my Bulletin 14 (new series), of the Division of Entomology, p. 112, given in a work entitled "New England's Memoriall," by Nathaniel Moreton, printed at Cambridge, Mass., in 1669. The work cited I was unable to get, but an account seen by me was a quotation from it published in Barton's Medical and Physical Journal of 1804. The brood referred to by Moreton is undoubtedly the same one referred to above, but the occurrence of 17 years previous. Moreton, publishing of an event happening 36 years after it occurred, evidently made a mistake of one year, the occurrence not being 1633, as stated by him, but 1634. We have records of this brood in New England from 1787 to 1886, and another occurrence may be anticipated in 1903. The records, if any were made of it after 1651 and prior to 1787, have not been discovered.

The Periodical Cicada was discussed further by Messrs. Quaintance, Gill, Marlatt, Waite, and Kotinsky. Mr. Waite stated that crows appeared not to damage the crops this year but seemed to feed principally on the cicadas. Mr. Marlatt exhibited photographs, taken *in situ*, of the cones in the woodshed above referred to and of imagoes on trees, and pupal shells adhering to the leaves, taken by Mr. Kotinsky and himself.

—Dr. Dyar showed a specimen of *Acalla* (*Teras*) *nigrolineana* Robs. from the Asa Fitch collection, probably taken in New York fifty years ago and labelled by Fitch "*Sarrothripa? novæboracana*." Another specimen of this species has recently been sent to the National Museum for name by Mr. H. D. Merrick; it was taken in New Brighton, Pa.

—Dr. Dyar also showed specimens of moths from the *Bumelia lanuginosa* of Texas. Mr. Schwarz has discovered an interesting fauna on this tree during his trips to that region, and he brought home from Victoria, Texas, three kinds of larvæ, two of which have been bred and prove to be *Litodonta hydromeli* Harvey and *Euerythra phasma* Harv. The third was a little squarish, slug-shaped larva with soft skin and black lines that must be that of *Mieza psammitis* Zeller, as these moths were captured in the same locality. The only specimen that reached

Washington was unfit to describe in detail. The Notodont larva, Mr. Schwarz says, was attenuated behind, green, marked with darker green. The anal feet were not raised. The head was rounded triangular, higher than wide, narrowed above, scarcely bilobed. The Arctian larva had a pale brown head and was covered with dense tufts of stiff, brownish hairs. Mr. Caudell is now in this region and may possibly secure more perfect material of some or all of the species.*

—Dr. Dyar further showed specimens of the moth of *Catastega timidella* Clem., an inflated larva, pupa shells, larval work and a parasitic fly, *Eulasiona comstockii* Towns., bred from this moth. The genus Catastega was founded by Clemens on three larvæ with peculiar habits, the moths of which were unknown to him and to all subsequent students. Stainton suggested in his edition of Clemens' papers, that the genus might belong to the Phycitidæ, a very plausible suggestion, as many Phycitids have habits very similar to those described for Catastega. The only objection to this suggestion is that it does not agree with the facts. Mr. Busck has bred, on a different plant, a new species of Gelechia with Catastega-like habits. He had, therefore, concluded to refer Catastega as a synonym of Gelechia. But the same objection applies as to Stainton's suggestion. The moths are Tortricids. *Catastega timidella* larvæ occurred commonly on oak at Bellport, N. Y. The larvæ were matured in September or later and the moths emerged at Washington the following May. Unfortunately the two specimens obtained, both females. were considerably injured in a badly constructed cage, and Dr Dyar does not feel certain as to what known species they should be referred as imagoes. He suggested in regard to the other species of Catastega that *C. hamameliella* Clem. might be *Semasia argutana* Clem. and *C. aceriella* Clem., *Proteopteryx spoliana* Clem.

—Dr. Dyar showed specimens of two butterflies from the Olympic Mountains, Washington State, an Erebia and a Brenthis, sent to the National Museum by Mr. C. V. Piper. The Erebia is *E. vidleri* Elwes, hitherto only recorded from the Fraser river, British Columbia. The Brenthis may be identified

*Mr. Caudell has since returned, and has bred *Mieza psammitis*, verifying my identification.—H. G. D.

as *B. chariclea* Schneid. var. *arctica* Zett. It does not agree exactly with *artica*, being more variegated and brighter colored beneath, but it agrees still less with *helena*, under which name it was sent, as the band on hind wings below is too dentated and variegated with white for that form. But as the synonymy of *chariclea* is already considerably involved it is better not to add a new name to it. True *chariclea* seems not to occur in North America, but we have several forms which should be referred as varieties of it, as follows:—

Brenthis chariclea Schneid.
 kolænsis Reuter.
 a. boisduvalii Dup.
 b. arctica Zett.
 obscurata McLach., *butlerii* Edw., *tarquinius* Curt.
 c. helena Edw.
 d. montinus Scudd.

—In connection with this subject, Dr. Dyar presented the following synoptic tables:

SYNOPSIS OF THE NORTH AMERICAN SPECIES OF EREBIA.

By Harrison G. Dyar.

Wings without ocellated dots or transverse fulvous bands above.
 Entirely black on both sides.............*magdalena* Streck.
 More or less red shading over disk of fore wings above.
  A defined gray submarginal band on secondaries below. *fasciata* Butl.
  Secondaries below mottled and clouded with gray. *discoidalis* Kirby.
Wings with transverse fulvous bands above, usually marked with ocellated spots.
 Hind wings below, dark and pale grayish.
  Fore wing with short fulvous band containing two ocelli between veins 4 to 6.
   Hind wings below with gray submarginal band. *rossii* Curt.
   Hind wings below all pale gray suffused..*tyndarus* Esp.
  Fore wings with longer fulvous band containing ocelli below vein 4.
   No ocellus in the interspace 3-4 or, if present, conspicuously smaller than those in the interspaces 4 to 6.
    Hind wing below blackish with gray submarginal band................*vidleri* Elwes.
    Hind wing below with submarginal fulvous-edged ocelli...................*epipsodea* Butl.

Ocellus in the interspace 3-4 subequal with those in 4-6.
A whitish patch in end of cell on secondaries below in interspace 4-5............... *disa* Thunb.*
Without this patch..................... *youngi* Holl.
Hind wings below with quadrate intravenular pale fulvous spots............................. *sofia* Streck.

SYNOPSIS OF THE NORTH AMERICAN SPECIES OF BRENTHIS.

By Harrison G. Dyar.

Outer half of hind wings below variegated or mottled similar to the basal part of wing.
Spots on hind wings below well separated by the veins.
Shading on hind wing below brown; a distinct black dot in cell............................. *myrina* Cram.
Shading below ferruginous; dot in cell indistinct.
Submarginal dots solid; size larger.. *astarte* Doubl.
Submarginal dots annular; size smaller....................... *aphiraphe* Hübn.
var. *triclaris* Hübn.
Spots below diffused, forming a more or less distinct median band, scarcely divided by the veins.
This band showing more or less white and yellow.
Whitish spot in end of cell continued by a streak beyond cell.
Whitish scalloped line beyond median band faint, narrow.
Lighter submarginal space between veins 3-5 contracted or obscure.
Purplish brown below.... *chariclea* Schneid.
var. *boisduvalii* Dup.
Ferruginous brown below, var. *montinus* Scud.
Lighter space broader, conspicuous.
Band below more dentate, partly white, var. *arctica* Zett.
Band below less dentate, mostly yellow, var. *helena* Edw.
Whitish line distinct, broad.
This line within the submarginal dots, nearly continuous .... *freija* Thunb.
This line touching or partly surrounding the submarginal dots, maculate ...... *polaris* Boisd.
Whitish spot in end of cell confined to cell, *pales* Schiff.
This band obscured, pale, the whole wing with the marks obscured and smoky .... *alberta* Edw.

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* It is difficult to see wherein *youngi* Holl. differs specifically from *disa* Thunb.

Outer half of hind wing below smoothly purplish, clouded, faintly marked, contrasted with the basal part of wing.
Hind wing above heavily black shaded at base.
Size larger.
Band below little obscured by dark scales, *frigga* Thunb.
Band below much obscured by dark scales, var. *saga* Kaden.
Size smaller, more obscured..........var. *improba* Butl.
Hind wing not so shaded.
Hind wing with the costal whitish spot below more or less joined to basal one; fore wings often angled..............................*bellona* Fabr.
Costal spot below separate; fore wing not angled.
Hind wing below outwardly purplish..*epithore* Boisd.
Hind wing below outwardly pale ochraceous, *youngi* Holl.

—Dr. Dyar then read the following paper:

THE LIFE HISTORY OF A SECOND EPIPLEMID.

(*Callizzia amorata* Pack.)

By Harrison G. Dyar.

I have previously described, in part before this society (Can. Ent., xxx, 155, 1898; Proc. Ent. Soc. Wash., iv, 414, 1901), the life history of one species of Epiplemidæ *Callidapteryx dryopterata* Grote; I am now able to refer to a second species, *Callizzia amorata* Pack., and show that it agrees in all those peculiar characters with the first known species. My acquaintance with *C. amorata* larva began in 1894 when I found a number of them on a wild honeysuckle bush at Keene Valley in the Adirondack mountains of New York. Only the smallest larvæ are usually found on the leaves, the older ones become brown in color, and hide, probably at the base of the plant. So I saw only the small ones and thought the minute colorless larvæ were some species of "Micro." and they did not interest me enough to seriously attempt to raise them. I did not see the species again till 1900, when I met with the larvæ on the summit of Stony Man Mountain in the Blue Ridge mountains of Virginia. This time I quickly suspected their identity, but was unable to bring them to maturity. The next season Miss Wellesca Pollock kindly undertook to get some more from the mountain and she successfully carried them to the pupa stage. The moths emerged this Spring.

Egg.—Flat at the base, subcylindrical, rounded above, the base broadened; soft, somewhat irregular in shape, the basal outline not always circular; about twenty vertical ribs, increasing confluently by many more at the flared base, confused with coarse reticulations at the vertex, which is sometimes ring-like; distinct, fine, parallel cross-striæ, forming fainter reticulations at the vertex. Translucent white; diameter .5, height .4 mm.

Laid scattering on the backs of the leaves, solitary, but many on one plant and perhaps none on the adjoining one. Larvæ in various stages at the same time.

*Stage II**.—Head rounded, whitish, eye black, mouth brown; width .3 mm. Body cylindrical, the feet normal; all translucent whitish, food showing green. No perceptible tubercles; setæ fine white, moderate.

Stage III.—The same; head .4 mm. Body thick and robust with distinct incisures, joint 12 slightly enlarged. Tubercles a little elevated, colorless, transparent; setæ white, distinct.

Stage IV.—Head rounded, flattened before, bilobed, whitish, ocelli black, mouth dark brown; width .6 mm. Body thick, joint 12 a little enlarged, joint 13 small, subtruncate; feet all equal. Translucent white, the elevated tubercles concolorous; no marks. Setæ white, distinct. Food green, but the blood is colorless. The larvæ reach 6 mm. in length and are robust and thick. Dorsal vessel greenish. A few of the tubercles become finely black marked. Legs slender.

Stage V.—Head erect, slightly bilobed, flattish before; translucent white, vertex black powdered; ocelli black, labrum blackish, quadrate; width .85 mm. Body thick and robust, joint 12 slightly enlarged, feet normal, slender. Translucent white, greenish tinted, food green; edge of cervical shield and prespiracular tubercle on joint 2, tubercles ia+ib and iia+iib on joints 3 and 4, i to iii on joints 5 to 12 all marked with deep black, the spots on tubercle iii being the largest. Setæ distinct, faintly brownish; tracheal line white with a white shading about it. On the thorax tubercles ia and ib are united, iia+iib, iv+v, iii separate, vi 2-haired. On abdomen i dorsad to ii except on joint 12 where they form a square, iii large, situated above the brownish spiracle which is much the largest on joint 12; iv and v in line, united on joints 5 to 9 though becoming less approximate posteriorly, separate on joints 10 to 12, on the latter by a considerable space; vi single; vii on the transparent

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*Stage I was observed in the Keene Valley larvæ, but I neglected to record a measurement of the width of the head. It was not possible to examine fully the youngest of the Stony Man larvæ, so that I cannot positively correlate my results, but assume six stages from analogy with *C. dryopterata*. In Stage I the larva is entirely colorless, the food showing green. Tubercles large but without basal plates, primary ones only present, iv and v in line or v a little dorsad, vi absent, vii a single hair on the leg-plate. Setæ rather long, simple.

leg-plate, consisting of scattered hairs, not a defined tubercle. Crochets of abdominal feet few, on the inner two-thirds of the planta only. Shields not cornified, concolorous.

Stage VI.—Head whitish with a broad band of confluent black-brown mottlings on the face of each lobe, narrowing below, furcate at the vertex; clypeus moderate, depressed at apex; mouth brown, ocelli black; width 1.4 mm. Rounded, scarcely bilobed, lower than joint 2 but not retracted. Body cylindrical, a little flattened, thick and squarish; feet normal, rather slender. Dorsum sordid brown, edged by a black lateral band (tubercle iii) somewhat diffuse above; joint 2 dorsally and subventer whitish, distinctly whitened about the spiracles. Tubercles i to vi black, rather large, a little elevated, iii the largest; vi double the whole length, the pair united on joints 2 to 6, separate on 7 to 11, approximate on 12; iv and v in line, united on joints 5 and 6, nearly so on 7, separate on 8 to 12, more widely so posteriorly [Stages v and vi not described from the same larva]. Setæ moderate, dusky. In this stage the larvæ go down off of the leaves and hide, in the daytime, feeding only at night, not resting on the backs of the leaves as they did before. Later the dorsum darkens to various shades of dead-leaf brown shading to black at the edges subdorsally. Subventral region white, divided by a narrow sordid line.

Pupation at the surface of the ground, the small brown pupa resembling that of *Callidapteryx dryopterata.* Food plant *Lonicera dioica*, named for me by Mr. C. L. Pollard.

A discussion then followed, participated in by Messrs. Ashmead, Gill and Heidemann, upon the systematic value of characters furnished by the eggs of insects.

—Mr. Ashmead called attention to a valuable paper published by Mr. C. T. Brues in the American Naturalist for May, in which were descriptions of several new genera of flies, some new beetles and a curious new genus of Proctotrypids, all taken in connection with studies on the nests of Eciton.

—Mr. Marlatt recorded some observations made by Mr. Kotinsky and himself on the feeding habits of certain predaceous insects hitherto considered as beneficial, but which may have to be classed rather as injurious species. These observations were made in connection with the breeding experiments and studies of the imported Asiatic lady beetle (*Chilocorus similis*). In one of the outdoor breeding cages the larvæ of *Adalia bipunctata*, a Coccinellid beetle, which commonly feeds upon aphids, oc-

curred in great numbers feeding on the common plum aphis infesting the inclosed tree. These larvæ were observed in one or two instances to eat the larvæ of the Chilocorus, and when they were brought together in a jar the Adalia larvæ attacked readily the younger larvæ of the Chilocorus. While the normal food of the Adalia consists of plant-lice, it seems to have a rather general feeding habit, and very probably will eat anything of the insect sort which is alive and soft, including the larvæ of its own species. Large numbers of the wheel-bug (*Prionidus cristatus*) were also found in the little Department grove, and these also were observed to feed on any scattering ladybird larvæ which they came across, including Chilocorus. The wheel-bug never fed upon the scale, and its only function in the orchard was an injurious one, destroying the larvæ of both the plant-lice and scale-feeding ladybirds. He referred also to the introduction of the European rear-horse (*Mantis religiosa*), which, as well as our native species, feeds on ladybird larvæ. The larvæ of a lace-winged fly (*Chrysopa* sp.) preyed also on the Chilocorus. Summing up these observations, he expressed the belief that all the insects mentioned, and other general-feeding predaceous species, ought perhaps to be classed as harmful rather than beneficial. The fact that they occasionally destroyed injurious larvæ is scarcely to be taken into account for the reason that the larvæ so destroyed are usually of species which are easily controlled by other means. The important point is that they destroy the larvæ of insects such as the ladybirds, which prey naturally on classes of insects—plant-lice and scale species—which are with difficulty destroyed by artificial means. The position of the Adalia may, perhaps, be questioned in this regard, and probably under normal circumstances it confines its food pretty strictly to the plant-lice, and only attacks other soft-bodied insects in times of scarcity of its normal food.

October 16, 1902.

The 171st regular meeting of the Entomological Society of Washington was held at the residence of Mr. Frank Benton, "Argyle," Fourteenth street extended, N.W. Dr. Dyar occupied the chair and Messrs. Marlatt, Gill, Waite, Hopkins, Barber,

Pollard, Schwarz, Benton, Caudell, Howard, Heidemann, Morris, Patten and Currie, members, and Messrs. Cundiff and Warner, visitors, were also present.

Mr. Heidemann reported that he had collected, during last June and July, near Brightwood, D. C., two Fulgorids new to the District of Columbia, *Phylloscelis pallescens* Germar and *P. atra* Germar. Of the former species but one specimen was collected, but of the latter quite a series. Mr. Heidemann remarked that *pallescens* possessed venational differences from the other species of the genus, sufficient, he thought, to justify erecting for it a new genus.

—Mr. Schwarz mentioned that during his recent collecting trip in Arizona he had frequently come across accumulations of insect eggs under the bark of old pine stumps. At Flagstaff, Arizona, he found one such mass containing about one hundred eggs. These subsequently hatched into larvæ of some longicorn, but what species it was difficult to say. There seemed to be but one longicorn beetle active there at that time, a *Criocephalus* which was observed in abundance under the bark running around and copulating. It seemed improbable that the eggs were laid the year before. They might belong to the *Criocephalus* though they seemed rather too large for a beetle of that size. A specimen mass of the eggs was exhibited.

—Mr. Caudell stated that the type of the grasshopper *Eritettix simplex* Scudder, which has been lost sight of for some time, has lately been found by Mr. James A. G. Rehn of Philadelphia. Specimens collected by Mr. H. S. Barber in Arizona, on comparison with the type, have proved to be this species which must, therefore, be restored to our lists.

—Mr. Warner exhibited a twig of some plant, bearing a large number of seed vessels which were infested by some insect. The insects' holes of emergence seemed to be all on one side of the twig, and Mr. Warner wondered what side of the plant, bright or shady, was most favorable for their development. Mr. Schwarz said that in Arizona insects seemed to work perferably on the southeast side of plants and trees. He did no know, however, why such was the case.

—Dr. Hopkins showed specimens of the work of a bark beetle (*Phlœosinus cupressi* Hopkins, n. sp., MS.) in broken

branches of the Monterey Cypress from the famous grove at Cypress Point, near Monterey, California. The natural distribution of this tree is restricted to a few acres in this one locality, but it has been extensively transplanted throughout Western California for hedges and ornamental purposes, thus extending the range of the beetle and enabling it to acquire the habit of attacking other species of cypress and also the redwood. While the Phlœosinus does not seem to kill the trees and is comparatively harmless in the native grove, it has become a destructive pest under the influence of its new environment. The adults' habit of attacking and killing living trees and of feeding on the bark of living twigs is a characteristic which has not been observed in any other species of this genus.

—Dr. Hopkins also showed the work of a species of *Hylesinus* in Red Fir from Port Townsend, Washington. This species has previously been found in White Fir.

—Mr. Marlatt noted that the common Dog-day Cicada (*Cicada tibicen* Linn.) had given evidence of an important fall brood. Quantities of these insects had issued from the 15th of September into October. He had found on a morning three or four freshly emerged insects, not yet hardened, on the trunk of a single tree, and that under many trees in the Department grounds, and on his own premises, this late emergence had been in considerable numbers, indicating a really important fall brood.

—Dr. Dyar showed slides of the four larval stages and pupa of *Dixa centralis* Loew, with sketches of the larva. The larva is a surface feeder in stagnant pools and suggests *Anopheles* when it goes wriggling across the surface of the water. It has a sessile breathing apparatus as in *Anopheles*. The habit of the insect is to reach the edge of the pool or some floating object and squirm up to the very edge of the water film. It is furnished with five pairs of false feet, crowned by hooks, on abdominal segments 1, 2, 5, 6 and 7 respectively. These enable it to climb up on the object it rests on to the very edge of the water. The larva rests curved like the end of an ellipse, and it progresses with the end of the loop foremost. This end is composed of the third and fourth abdominal segments and they are practically hairless. Long hairs arise from each end of the body which serve to hold the head and tail in position in the water, keeping

them from moving backwards as the larva jerks first one and then the other forward. In feeding it bends the head at nearly right angles to the body and moves the mouth brushes and antennæ rapidly.

—Dr. Dyar also showed the larval work of *Argopistes scyrtoides* Lec., a beetle inhabiting the lower east coast of Florida. He had collected these larvæ in February, 1900, mining in the leaves of *Forestiera porulosa*, a large shrub, resembling the privet. The mine goes back and forth about the margin of the leaf, and the beetle larva transfers itself to a new leaf when one is emptied. The larva is flattened, pale whitish with an orange stripe about the subventral fold; head and cervical shield blackish brown; thoracic feet black; no abdominal feet. The larvæ transformed in the earth.

—He exhibited further a series of a Noctuid moth, showing much variety, collected on the sand dunes at Santa Monica, California, by Mr. J. J. Rivers. The specimens seem referable to the very variable *Carneades perexcellens* Grote, but they differ from all the described forms of that species by the very pale hind wings, which run to almost immaculate pure white. It would seem admissible to designate this form by a new name, and it may be called var. *riversii*, in honor of the veteran entomologist who collected it.

—Dr. Howard stated that drawings of Dixid larvæ had been made by the late Mr. H. G. Hubbard. He had noticed the resemblance to larvæ of *Anopheles*; in fact an old drawing supposedly *Anopheles*, had afterward proven to be *Dixa*.

—Mr. Schwarz, commenting on Dr. Dyar's note concerning *Argopistes scyrtoides*, said that he had beaten this flea-beetle from the dodder (*Cuscuta*) plant near Miami, Fla., while Mr. Hubbard had found it on the same plant near Jupiter, Fla. He stated that in some genera of the Chrysomelidæ all the species have leaf-feeding habits, while in other genera certain species only feed upon the leaves, others live on the roots, or are leaf-miners.

—Mr. Schwarz exhibited a ball of pine resin collected by him in Arizona, which, upon examination, proved to be the nest of a bee of the genus *Anthidium*. The nest was preserved in the hope of rearing the bee and ascertaining its species. Instead of

the bees, however, two specimens of a blister-beetle, *Nemognatha nigripennis* LeConte came out. Mr. Schwarz said that as far as known the species of Meloidæ are either parasites of bees or grasshoppers. As a general rule those species which appear in the spring are bee parasites, while those which appear in the fall are parasites of grasshoppers. He expressed surprise that the bee could work in such a sticky substance as pine resin without disastrous consequences. Mr. Benton said that he thought it was not more difficult for this bee to work in the resin than for honey bees to handle the sticky propolis.

—Mr. Marlatt read the following paper:

A CHALCIDID PARASITE OF THE ASIATIC LADY-BIRD.

By C. L. Marlatt.

A very important hymenopterous parasite must be added to the list of natural enemies of the Asiatic lady-bird (*Chilocorus similis*). To our very great disappointment and astonishment early in September it was found that the pupæ of the last brood were much parasitized, causing a loss of more than ten per cent. of this brood. As many as could be of these parasitized pupæ have been collected, and from them has been reared a little Chalcidid fly, *Syntomosphyrum esurus* Riley, from five to seven parasites coming from each pupa. This insect belongs with a group of secondary parasites, but no trace of the primary parasite could be found in any of the pupæ examined, although later breeding may develop the primary parasite during the winter or next spring. The larvæ were found free in the abdominal cavity of the Chilocorus pupa and ultimately all of the substance of the pupa disappears. In one or two cases where parasitism had only just begun to make itself evident, half-grown larvæ were found. These were filled with the yellow fluid contents of the Coccinellid and were orange yellow in color. The older larvæ in the nearly empty shells of the pupæ were whitish in color. That all of these larvæ are of the parasite mentioned above cannot be definitely said. Doctor Howard, who examined the material with the writer, is of the belief that the primary parasite will prove to be *Homalotylus obscurus* how., the common coccinellid parasite of this country. If the parasite bred proves to be a true secondary parasite, as believed, its presence in such numbers in the pupæ of Chilocorus is a matter for gratification. If, on the contrary, it be a primary parasite, it seriously threatens the success of the imported Chilocorus and all allied lady-birds. The status of this parasite is given in the appended note by Dr. L. O. Howard.

"All of the Tetrastichinæ known and whose exact host rela-

tions have been determined are hyperparasites. *Syntomosphyrum esurum* Riley has never been proved to be either secondary or primary. It is, or was, a common parasite of *Aletia argillacea* in the cotton fields of the South late in the summer. It issued frequently and in great numbers from old chrysalids left hanging bare upon the cotton stalks. The chrysalids on being opened were found full of this parasite, and no trace of a primary parasite was ever found. Hence this insect was considered in Bulletin 3 of the U. S. Entomological Commission, and in the Report on Cotton Insects by J. H. Comstock, published by the Department of Agriculture in 1879, to be a primary parasite. The question as to whether it might not be a secondary parasite was raised by me in the 4th Report of the U. S. Entomological Commission. It was reared, as recorded in Bulletin 5 (Technical Series), of this Division, by Dr. A. D. Hopkins, at Morgantown, W. Va., from *Orgyia leucostigma*. It was reared abundantly in 1896, in the late winter and early spring, at Washington, D. C., from the chrysalids of *Hyphantria cunea*. Moreover it was reared by F. M. Webster in 1889 on May 3rd, according to the notes of the Division, from the galls of *Trypeta gibba* Loew, on *Ambrosia artemisiæfolia*. But these Trypeta galls, especially late in the season, are apt to contain several different kinds of insects, not only primary parasites but frequently lepidopterous, coleopterous and dipterous larvæ, so that the rearing from the gall means nothing at all, the presumption, however, being that the insect came from the Trypeta either as a primary or a secondary parasite.

Summing this evidence all up, we have the insect reared undoubtedly from lepidopterous chrysalids and from coleopterous chrysalids (that is to say, the Coccinellids under consideration) and also possibly from dipterous insects. Unity of habit, that is to say, unity of host relation, is so marked among the Chalcididæ that wherever such a diversity in the apparent hosts occurs it has become my rule to place such parasites as undoubtedly secondary or tertiary parasites. The primary parasites of a given group of insects belong to certain definite groups. Examples are so numerous that they need not be mentioned. In no case in the whole family, to my knowledge, are the parasites of a single genus parasitic on more than one order of hosts, and in some instances they are confined even to individual families of hosts, and the assumption that a single species of Chalcidid may be reared from coleopterous, from lepidopterous, as well as possibly from dipterous hosts, is almost an absurdity. These are the principal reasons upon which I base my belief that *Syntomosphyrum esurum* is a hyperparasite."—L. O. H.

—Dr. Dyar then read the following paper:

NOTES ON MOSQUITOES IN NEW HAMPSHIRE.

By Harrison G. Dyar.

These observations were made at Center Harbor, on Lake Winnepesaukee in the hilly part of New Hampshire, where I spent most of the summer of 1902. The lake has an altitude of 500 feet above the sea and is a large body of clear, cold water. The land surrounding it is very hilly, almost-mountainous, sandy for the most part, with many rocks and boulders. A considerable part of the country is forested, sheltering some spring pools and marshes. Other marshy places occur at the edges of the lake and in the lower, partly cleared woods. There are no streams in the immediate vicinity.

Mosquitoes are not usually abundant. In fact this is one of the places described as "free from mosquitoes and malaria." However, in 1902 mosquitoes were abundant and troublesome, but only for about a month, from the middle of May to the middle of June, as I am informed. I reached Center Harbor on June 20th. At that time only an occasional mosquito was seen about the house or in any open space, though in the woods they were still not uncommon. The commonest species was *Culex canadensis* and next to that *Culex reptans*. That is at the time of my arrival. Later *C. reptans* gradually disappeared, being replaced in the same woods by *C. triseriatus*, which, however, did not become common. The other species were rare. *Culex cantans* was not infrequent in certain localities at the end of July. *Culex pipiens* did not occur. Mr. Coquillett at first identified two captured males as of this species, but a re-examination corrected the determination. Rain-water barrels and other likely places remained free from "wrigglers" all summer. *Anopheles* occurred, in two species, but not very commonly.

Besides the collections made at Center Harbor, one day was spent at Durham, N. H., which resulted in adding two species to the list, *C. sollicitans* and *C. pipiens*. The latter was present at Durham in its usual abundance, and larvæ were found in several places. Durham is situated at the head of tide water in low, nearly level farming land. It is seventy-five miles from Center Harbor in a straight line.

Anopheles punctipennis Say.

Larvæ occurred in a rain-water puddle by the side of the road, but few of them matured, as the puddle dried, owing to the sandy soil. Other larvæ were taken in pools containing algæ, in low rocky islands in the lake, from a marshy pool of consider-

able size in partly cleared woods and, as usual, from nearly every kind of water examined, but in no great abundance.

Anopheles maculipennis Meig.

This species was rare. Curiously enough, all the larvæ found were alike and of a peculiar, striking coloration. They were at once separable from *punctipennis* by being black with a straight, narrow, white dorsal line, furcate on thorax. The white-spotted *punctipennis* were never marked with such a uniform line.

Culex canadensis Theob.

Very common at first, gradually decreasing in numbers, but continuing all summer. Larvæ occurred in a cold spring-pool in woods late in June, but they were not abundant, apparently most having completed their transformations. Others were taken in road-side puddles. A few stragglers occurred till the middle of July, but after that few more were found. Eggs were obtained from females confined in jars; I did not find them in nature, though larvæ in the first stage were several times collected. The eggs are probably laid in places where water is liable to collect, or in pools. In the latter case they sink and would be very difficult to find. The eggs from the females in jars were kept in water. One hatched immediately, two more in about a week, and another in two weeks, but most of them remain unhatched yet, apparently hibernating. They are laid singly.

Culex reptans Meig.

Perhaps about half as abundant as the preceding species. The occurrence was the same, principally a woodland species and only troublesome about the house at the period of greatest abundance. No larvæ were found, and I think that the species had ceased breeding before June 20th, when I arrived. The decline in numbers of the adults was even more marked than with *C. canadensis*, scarcely any being taken with the net after July 15th, though so common at first. The last ones taken had become much worn. This is probably a truly single-brooded mosquito with the principal time of flight in June and without the continuous addition of a few fresh specimens as with *C. canadensis*. The fall and winter are probably passed in the egg stage. I neglected this species, having gotten the idea that it was common, and so failed to secure eggs.

Culex cantans Meig.

Rare in my usual collecting ground, a pine woods near the lake, but rather common about two miles distant in the low land between Lake Winnepesaukee and Lake Squam. Only adults were taken and these became much worn as the season advanced. This is another strictly single-brooded species with hibernation in the egg stage. No larvæ were seen. Eggs were obtained from females confined in jars, but they all remained unhatched till the present time.

The larvæ referred to as *cantans* previously (Proc. Ent. Soc. Wash., v, 47, 1902), should be attributed to the following species, *C. sylvestris* Theob. The larva of *C. cantans* is yet entirely unknown.

Culex sylvestris Theob.

A few examples only were taken with the net, but many were bred from larvæ. The larvæ occurred in all sorts of temporary pools, swamps and muddy roadside puddles alike. They occurred mixed with other short-tubed larvæ, principally *Culex canadensis* and *Aëdes fuscus*. These three species have essentially similar habits. A roadside puddle was found filled with them; when it had nearly dried, I collected the whole, leaving it empty. After the next rain it was again filled with these same three species (though less of the *canadensis* in proportion). Probably their eggs were lying at that place and some hatched after each rain. A large muddy puddle at Durham contained thousands of "wrigglers," and these were nearly pure *sylvestris*, as shown by breeding.

Eggs were obtained from captive females, essentially like those of *canadensis* and *cantans*, laid singly and sinking in water. They were obtained late in the season and have not yet hatched.

Culex territans Walk.

No adults were taken with the net. I made a practice of taking all the mosquitoes that came to bite, but never saw a *territans*. Still the species was common, for the larvæ occurred in every suitable pool and, after the middle of July, they were the most abundant *Culex* larvæ to be found. They continued all summer. I am driven to the conclusion that *C. territans* does not bite. At Bellport, N. Y., where I met with it before (Proc. Ent. Soc. Wash., v, 48, 1902), I could not draw this conclusion, because *C. pipiens*, closely resembling it, occurred commonly, and it was impossible to catch all the mosquitoes that came to bite on account of their numbers. Still all the *territans* that I got at Bellport were bred. Eggs were not obtained from captive females. I have a female, still alive, that I have had for nearly three months, which has refused to lay eggs. It will not bite, but feeds on sugar-water. However, I secured some egg shells from a small pool that was full of *territans* larvæ, and I believe that they are the eggs of this species. They are deposited on the surface of the water in little boats composed of three or four eggs each, adhering by their flat sides, the mass floating sideways on the water. They are so minute as to entirely escape ordinary observation, and are only to be distinguished from the many little black specks floating on the water by examination with a lens. The larvæ pass four stages to the pupa, the life cycle occupying three weeks from

egg to adult in warm weather. Breeding is continuous as with *C. pipiens*, and the winter is probably passed as adult.

In common with other species of *Culex* which have the legs without white bands, *territans* larva has the antennal tuft beyond the middle of the joint and the part of the joint beyond the tuft more slender than that preceding it. The most marked differential character is the very slender, elongate air tube, which separates this larva from that of any other mosquito yet known to me.* In the first larval stage the antennal tuft is situated at the middle of the joint; but the normal character is gained at the first molt, though the white banding is often very inconspicuous until the last stage. Most of the larvæ taken were dark in color, heavily shaded with brown; but some, from a sunny roadside puddle, were very pale, of a translucent white, with the chitinized parts light brownish.

Culex triseriatus Say.

A few examples were taken and others seen between June 20th and July 8th. After that they became somewhat more common, continuing all summer. No larvæ were collected; eggs from captive females hibernated. The species seems, therefore, single brooded, but I cannot quite account for the fresh specimens that were flying all the season. The eggs were laid singly, adherent to the surface of the glass of the jar, just in the edge of the water.

Culex melanurus Coq.

This is a dark-legged mosquito and consequently has a long-tubed larva. The larva is very characteristic by its darkly infuscated tube and plates and its peculiar lateral comb of the eighth abdominal segment, which resembles a grating, the spines being in the form of long bars in a single row. It is slow in development and very deliberate in all its motions, remaining long at the bottom of the water. It inhabits permanent pools, spring pools or deep rock pools. The eggs are laid singly on the surface of the pool, where they float. The shell is black as usual, but so thin that the unhatched egg looks gray except at the poles. Breeding is probably continuous, with hibernation as adult, but the species was so rare that I did not follow it continuously.

Culex dyari Coq.

Three larvæ, taken on the day of my arrival, in a cold, permanent spring pool, produced this species, and one specimen was caught afterwards. No more were seen. It is probably single brooded, an early spring brood with hibernation in the egg, as in *C. reptans*.

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*Except that of *C. nigritulus*, which I have received from New Jersey. This is very similar to *C. territans*.

Culex restuans Theob.

The larva occurred sparingly in permanent water both at Center Harbor and Durham. At the former place in spring pools, at the latter in a tub set in the woods for watering cattle. It greatly resembles that of *C. pipiens*, especially the pale form of that larva, but the outer part of the antennal joint is not shortened as is usual in the long-tubed mosquitoes, so that the tuft arises from the middle. This is a curious character, somewhat contradictory of the general characters of its group, but rendering its recognition easy. Only one adult was taken, a male, the species being rare. Breeding is probably continuous, with hibernation as adult. No eggs were obtained in New Hampshire, but I have found them at Washington, on my return in the fall. They are laid in large boats exactly as in *C. pipiens*.

Culex pipiens Linn.

As stated above, this species was absent from Center Harbor. It was not uncommon at Durham, and many normal larvæ with the antennæ completely infuscated were taken from a drainage ditch in a meadow. Other larvæ from the cattle tub, mentioned above, differed in being much paler, causing the antennæ to appear pale at the base, which led me to suppose that I was dealing with a different species; but Mr. Coquillett has examined the two bred series of adults and pronounces them alike.

Culex atropalpus Coq.

Two small pools in hollows in the flat surface of a rock beside a stream in the woods on the side of Mt. Ossipee were examined in September. One contained a colony of *C. territans*, the other, three feet distant, contained this species. The larva resembles that of *C. canadensis*, but the tube is shorter, the anal plate smaller, and the anal finger-shaped processes contain conspicuous tracheæ. In this particular colony these processes were enormously enlarged. The species did not occur near Center Harbor (Mt. Ossipee is ten miles distant); there are no rock pools there. No adults were taken.

Since my return to Washington, Mr. H. S. Barber has kindly shown me this species breeding abundantly in water-filled potholes at the edge of the Potomac river above Plummer's Island, Md. It was accompanied by *C. territans* as in New Hampshire. Apparently *C. atropalpus* breeds only in these rock pools.

Culex perturbans Walk.

Several examples were taken in July, but the species was quite rare and I learned nothing about the early stages.

Culex sollicitans Walk.

One example, taken at Durham during the day spent there. The species was not seen at Center Harbor which is seventy-five miles from salt water.

Uranotænia sapphirina O.-S.

Larvæ were found rather sparsely in a marshy pool filled with grass and algæ on July 25th, in all stages of development. They were in company with *Anopheles punctipennis* and *Culex territans*. The water of the pool was clear, but stagnant, the general environment being much as in the places where I found this species at Bellport, N. Y. (Jn. N. Y. Ent. Soc., ix, 179, 1902; Proc. Ent. Soc. Wash., v., 49, 1902). My account of the larva in the New York Journal contains an error in the description of the first stage. The ventral tuft of the anal segment is stated to be present, but it is really absent, not appearing until after the first molt. The figure on the plate is correct. The pupa of this species is as small as that of *Culex territans*, but has even longer air tubes. It may be recognized by this character from other mosquitoes.

Aëdes fuscus O.-S.

The species was not common on the wing. An occasional female came from time to time in the woods and was taken in the act of biting, continuing all summer. But many specimens were raised from larvæ. The larvæ occur freely in temporary pools, especially road-side puddles, and are only occasionally found in permanent water. They were in company with *Culex canadensis* and *C. sylvestris* and, like them, possess a short breathing tube, which seems to be the structure adapted for larvæ living in temporary pools. The larvæ with long tubes generally live in permanent water. The larva of *Aëdes fuscus* does not differ in structure from *Culex*. In fact it so nearly resembles *C. sylvestris* in all characters that they are difficult to differentiate specifically.

The following synoptic table may replace the middle portion of the table I presented last year (Proc. Ent. Soc. Wash., v., 51, 1902), the part dealing with *Culex* and *Stegomyia*. Seven species are now added and some of those before contained are more accurately differentiated.

Air tube long, about four times as long as broad at base.
  Antennæ with the tuft beyond the middle of the joint.
    Tube very long and slender, six times as long as wide or more; antennæ white banded.
      Tube concave, the tip wider than the terminal portion. Spines of tube mostly with a single basal branch .... *Culex territans*.
      Tube regularly tapered, smallest at tip. Spines of tube 3 to 4-branched .... *Culex nigritulus*.
    Tube moderate, five times as long as wide, or less; antennæ not conspicuously white marked.
      Anal segment without hair tufts anteriorly of the transversely barred area.

Lateral comb of the 8th segment a patch of spines; air tube brown.................................*Culex pipiens.*

Lateral comb a row of bars; air tube black...*Culex melanurus.*

Anal segment with hair tufts on the ventral line up to the base...*Culex dyari.*

Antennæ with the tuft at the middle of the joint.

Antennæ whitish on basal half.............................*Culex restuans.*

Air tube short, three times as long as wide, or less.

Lateral comb of the 8th segment a patch of small spines three rows deep or more.

Anal segment with hair tufts before the barred area.

Anal segment broadly plated...........................*Culex canadensis.*

Anal segment without hair tufts before the barred area. Anal segment narrowly dorsally plated.......................................*Culex atropalpus.*

Lateral comb of the 8th segment a few large spines in a single, or partly double row.

Anal segment with tufts before the barred area.

Comb of the 8th segment of separate, nearly simple spines.

Pecten of the air-tube composed of spines with three teeth; anal finger-shaped processes round-pointed......................................*Culex sylvestris.**

Air-tube spines with one tooth; anal processes sharply pointed...*Aëdes fuscus.*

Comb of conspicuously toothed spines, joined on a weak basal plate....................................*Culex jamaicensis.*†

Anal segment without tufts before the barred area.

Air-tube twice as long as broad.

Comb of the 8th segment of nearly simple, thorn-shaped teeth......................................*Culex sollicitans.*

Air-tubes not over one and a half times as long as broad.

Comb of the 8th segment of pectinated spines in an incompletely double row....*Culex tæniorhynchus.*‡

Comb of the 8th segment of branched spines from elongated bases in a single transverse row......................................*Stegomyia fasciata.*

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* This is the *Culex cantans* of my former paper in these proceedings. I had written the name *sylvestris* in the manuscript, but, by what now appears to have been an error, it was changed to *cantans* while in the hands of the publication committee.

† This is the *Culex confinis* of my former papers. Mr. Coquillett has improved the identification.

‡ Received from New Jersey from Mr. H. H. Brehme and from the District of Columbia from Mr. J. Kotinsky.

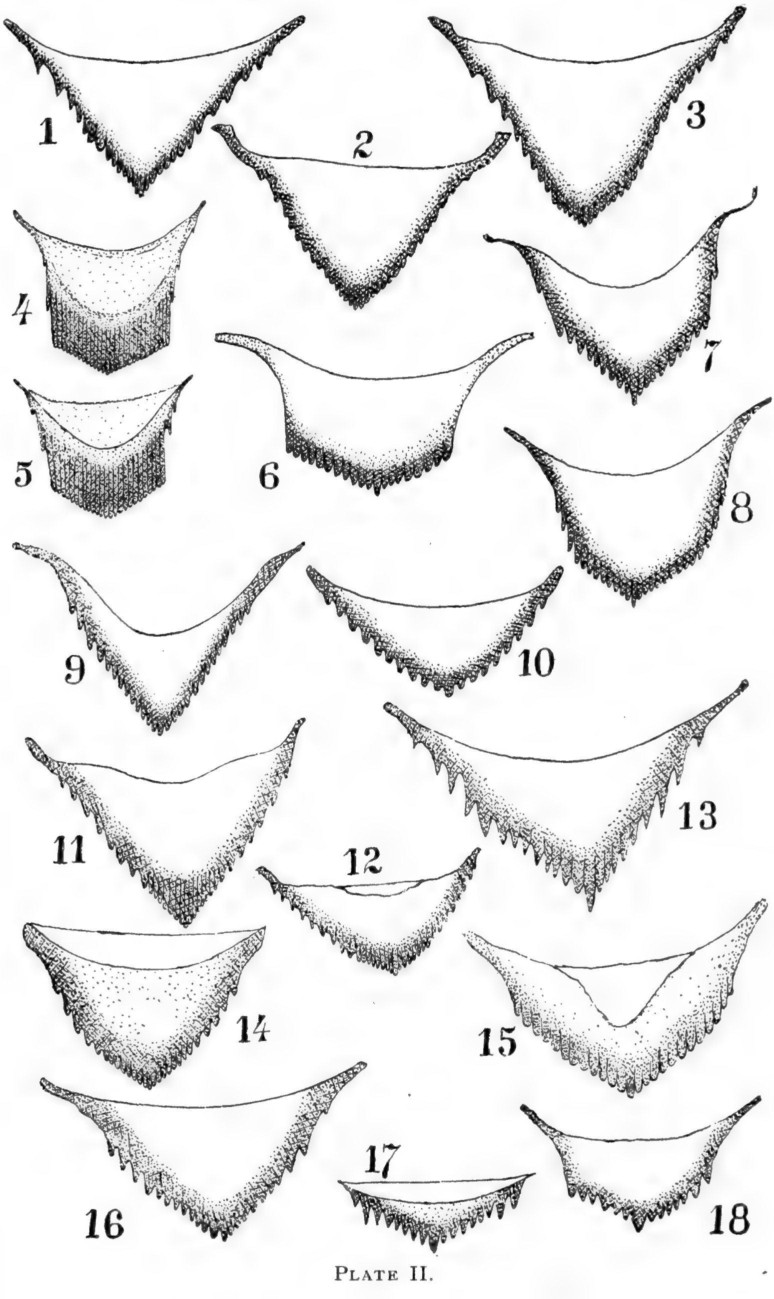

PLATE II.

Explanation of Plate II.

Labial Plate of Mosquito Larvæ.

1. *Culex sylvestris*, Durham, N. H.
2. The same, another example.
3. The same, Washington, D. C.
4. *Culex restuans*, Horners Town, N. J.
5. The same, Center Harbor, N. H.
6. *Culex nigritulus*, Elizabeth, N. J.
7. *Culex pipiens*, Durham, N. H.
8. The same, Washington, D. C.
9. *Culex jamaicensis*, Washington, D. C.
10. *Culex atropalpus*, Potomac river, Md.
11. *Aëdes fuscus*, Center Harbor, N. H.
12. *Stegomyia fasciata* (Army Medical Museum).
13. *Culex dyari*, Center Harbor, N. H.
14. *Culex bimaculatus*, Baton Rouge, La.
15. *Culex sollicitans*, Elizabeth, N. J.
16. *Culex canadensis*, Center Harbor, N. H.
17. *Culex melanurus*, Center Harbor, N. H.
18. *Culex territans*, Center Harbor, N. H.

Note.—Since these remarks were read, Dr. John B. Smith has published in *Entomological News* a series of figures showing the labial plate of a number of the species shown here. These should be consulted in this connection to show the variations in this structure in the same species. My plate shows the organ drawn to the same scale for all the species; in Dr. Smith's plate this is not the case. It will be seen that there is considerable variation in absolute size as well as in shape in the different species. Some of the species have been drawn from more than one example to indicate the individual variation. (See p. 153.)

Dr. Howard congratulated Dr. Dyar upon the results of his studies of mosquitoes, and said that he would await with interest their publication, when he would have an opportunity of learning the results of his work more in detail than was possible in listening to the reading of the paper. He had visited Holland in the middle of last September, he said, and made some observations on the occurrence of mosquitoes there. These seemed not to breed in the large canals but in the ornamental fountains near houses. *Anopheles* was abundant in South Holland. Mr. Warner mentioned some mosquito observations of his, and Prof. Hopkins spoke of species he had come across on the Pacific Coast and in North Carolina.

—The concluding paper was by Mr. Kotinsky, and entitled:

THE FIRST NORTH AMERICAN LEAF-GALL DIASPINE.

By Jacob Kotinsky.

While out collecting in the woods of the District on October 12, 1902, I was attracted to an undersized tree, several leaves of which were literally covered with small galls. The underside of these leaves was dotted with white specks corresponding to the galls above, and under a magnifying lens the former proved to be the scales of a Diaspine. This brought to mind similar specimens sent by Mr. W. M. Scott, of Atlanta, Ga., the preceding July to the Department of Agriculture, which I had the privilege of examining. Subsequent search and study revealed the following facts: That the insects as well as the food-plant are identical with those of Professor Scott; that the latter is the common sweet-gum tree, or bilsted (*Liquidambar styraciflua*); that scarcely a tree was inspected but was more or less infested with the insect, and that the insect is referable to *Cryptophyllaspis*, Ckll. (Bull. 6, Tech. Ser., Div. Ent., U. S. Dept. Agr., 1897, p. 14), and is a species new to science. I therefore describe it herewith:

Cryptophyllaspis liquidambaris, n. sp.

♀ gall.—Mostly on upper side of leaf, .5 to 2 mm. high, bluntly conical.

♀ scale.—Mostly on under side of leaf; waxy, central portion within the gall cavity a little beneath the level of the leaf surface; exuvium proportionately large, lemon yellow, subovate, about .4 mm. in diameter, wax rim about .2 mm. wide.

♀—Subcircular, about .3 mm. wide and .4 mm. long; anterior $\frac{2}{3}$ of body, and the lobes smoky yellow and heavily chitinized; caudal end transparent, no circumgenital glands; dorsal pores few; a group of three in line with and cephalad of first incision, and three parallel to these from a point cephalad of second incision; anal orifice 90 μ from base of lobes, 45 μ in diameter; one pair of median lobes 12–13 μ wide at base and 5-7.5 μ intervening space, notched on each side, lateral notches lower than interior; two incisions each side of the lobes, the caudal larger, wall thickenings subequal in all. The plates are shaped like those characteristic of *Chrysomphalus* spp., and are distributed as follows: two of the ordinary type between the median lobes; two of the *Chrysomphalus* type between each lobe and the first incision, and three between the first and second incisions; then there are also several dagger-shaped, beyond the second incision; the spines are slightly longer than the lobes, and a pair is to be found just cephalad of each lobe and incision. This description is from several specimens mounted in Canada balsam.

♂ scale.—White, waxy, oval; yellow exubrium nearer the anterior end. These are usually found grouped about the glands that the leaf bears at each end of its veins.

Habitat.—On leaves of sweet-gum tree, or bilsted (*Liquidambar styraciflua*). Mr. Bridwell tells me that Professor Scott found it also on twigs.

Atlanta, Ga., W. M. Scott, coll., July, 1902.

Washington, D. C., Jacob Kotinsky, coll., Oct. 12, 1902.

At first glance the mounted ♀ looks very much like *Aspidiotus rapax* Comst., but its smaller size (about ½) immediately separates it from that species. Careful study of the plates will also show marked differences. I placed it in this genus owing to its gall-producing propensities, a characteristic of *C. occultus* Green, from Ceylon, on *Gruvia orientalis*, upon which Prof. Cockerell based this subgenus of Aspidiotus, later raised to the rank of a genus. This genus, besides the species above described and the generic type, now includes in addition *C. rübsaameni* Ckll., upon *Codiæum* from Bismarck Archipelago, and, as Prof. Cockerell kindly informs me *in litt.*, "*C. bornmülleri* Rübs. from Madeira, on *Globularia salicina* (Marcillia, I, 1902, p. 62)."

Prof. Cockerell's remarks *in litt.* with reference to my species are too interesting to be omitted. He says: "*Cryptophyllaspis* is a gall-making derivative of the type of *Aspidiotus cyanophylli*, or, more broadly speaking, of *Diaspidiotus*. Your description does not seem to contradict this view, except that the anal orifice is perhaps too large, and the single pair of lobes is peculiar. These last characters suggest *Hemiberlesia*, and I suspect that you have in reality a gall-making *Hemiberlesia*. In that case, your species cannot be a *Cryptophyllaspis*, however much it resembles one. * * * (See my remarks in Ann. Mag. Nat. Hist., July, 1902, pp. 40–41)."

I am sorry not to have seen the description of Rübsaamen's species in order to see what relation it bears to the above. I may add in this connection that the species herein described is parasitized, though I have not bred the parasite as yet.

November 6, 1902.

The 172d regular meeting of the Entomological Society of Washington was held at the residence of Mr. O. Heidemann, 700 Newark street, Petworth. Dr. Dyar presided, and Messrs. Sherman, Hopkins, Busck, Gill, Kotinsky, Barber, Ashmead, Heidemann and Currie, members, and Mr. J. L. Webb, visitor, were

also present. Mr. W. V. Warner, 1522 Kingman Place, N.W., was elected an active member of the Society.

Dr. Hopkins, under the heading Short Notes and Exhibition of Specimens, showed some oak galls from black oak leaves, received through the Secretary of Agriculture and Bureau of Plant Industry, from Mr. Geo. F. Richards, P. M., Westcott, Missouri, with the statement in Mr. Richards' letter of October 15, that this substance was very abundant in that section, and that cattle, hogs, sheep, turkeys and chickens were all very fond of it and were getting fat on it. Its resemblance to wheat grains and its nutritive quality suggested to Mr. Richards the name "black oak wheat."

Andricus decidua Beut.

The same kind of gall was later received from Mr. A. G. Tower, Texarkana, Arkansas, with the statement that hogs fatten on it, and it was known there as "wheat mass."

The information relating to the nutritive quality of the gall suggested to Professor Hopkins the importance of having a food analysis made of it, and some of the galls were submitted to Dr. W. H. Krug, in charge of the Dendro-Chemical Laboratory of the Bureau of Chemistry, who analyzed it and submitted the following report:

ANALYSIS OF GALLS BY DR. W. H. KRUG.

Moisture	12.24%
Ether extract	3.37
Crude fiber (indigestible)	9.34
Protein	8.56
Ash	2.89
Carbohydrates (starch, etc.)	63.60

Relative food value = 93.43.
Nutritive ratio = 8.4.

"The relative food value is high and the nutritive ratio is wide, showing that this material is especially adapted for fattening animals.

STARCH DETERMINATION OF GALLS AND RED OAK ACORNS.

Size of starch grains:

Red oak acorn	5.7 (1.7–18) M.
Red oak galls	7.3 (2.6–12) M.

Starch grains vary in form, the acorn starch being more or less elongated in form and often somewhat truncated. They possess faint concentric rings and a hilum marking which tends to be crescent-shaped.

The gall starch grains are nearly spherical in form, occasionally truncated, and usually have a strongly-marked stellate hilum. The rings are more strongly shown than in the acorn starch. Both varieties are rather strongly active toward polarized light.

The starch grains from the galls resemble somewhat the reserve (?) starch of the woody tissue though the markings are rather more pronounced."

Dr. Hopkins stated that the galls appear to belong to a group designated by Osten Sacken as "swellings of the leaf, usually along the principal midribs, and containing numerous seed-like kernels." No specimens have been reared from the galls, but they appear to be the work of a species of *Callirhytis.*

Another gall on oak twigs, from Miss Alice Eastwood, San Francisco, California, was exhibited, which contains hazelnut-like kernels which readily separate from the enveloping woody swelling. This gall was identified by Mr. Ashmead as probably belonging to the genus *Callirhytis.*

In discussion Mr. Ashmead then stated that the gall-maker might not be a true *Callirhytis* but an *Andricus.*

—Mr. Busck stated that a box containing lost types of Clemens Tineids had recently been found in the Academy of Natural Sciences, Philadelphia. As a result of this valuable discovery twenty species of Clemens, which have up to this time been only guessed at, are now definitely known from the type specimens.

—Mr. Heidemann exhibited specimens of all stages of the Reduviid bug *Apiomerus crassipes* Fabricius. The larvæ and eggs shown were received from Mr. F. C. Pratt, who collected them upon a leaf at Great Falls in Virginia.

—Mr. Busck exhibited some peculiar woody balls which he had found in nests of *Eutermes* in Porto Rico. In the majority of the nests they were not found, but in some they were very numerous. Prof. Hopkins said he thought that Mr. Pergande had hit on the right idea in believing that these balls were condensed, stored food material.

—Dr. Dyar showed mosquito eggs, presumably of *Culex triseriatus* Say, which had been collected by Mr. J. Turner Brakeley, of Horners Town, New Jersey, at his suggestion. Mr.

Brakeley found the larvæ of this *Culex* abundantly in a certain old iron kettle on his place in the summer of 1902, and Dr. Dyar thought that the eggs might be found by a careful search of this kettle, bearing in mind the habits of oviposition observed in captivity. Such proved to be the case, Mr. Brakeley finding the eggs along the old water lines exactly as would be expected. The kettle was dry at the time of examination, November 2. It had, however, been more or less full of water all summer and apparently for previous seasons. The eggs were found at the points where the water level had remained constant long enough to form rings on the side of the kettle, singly, in lines of three to ten, or in groups. They adhered firmly to the side, but could be detached by a forceps moistened in alcohol or with a stiff brush. It thus appears that *Culex triseriatus* passes the winter in the egg state, as has been inferred. The eggs sent by Mr. Brakeley will be submitted to culture experiments to see if they will hatch.

—Dr. Dyar showed also a set of photographs of lepidopterous larvæ taken by Mr. A. Hyatt Verrill, of New Haven, Connecticut. Some of them showed the larvæ somewhat enlarged, bringing out the general appearance very nicely.

—He showed further some drawings of the mentum of mosquito larvæ, principally of the genus *Culex*, showing the modification in size and shape of this organ in the different species.* In *Culex pipiens*, *C. nigritulus* and *C. dyari* it is large with many teeth on the edge, the central tooth large and followed by small ones, again becoming large toward the base; in *C. territans* and *C. melanurus* the part is much smaller, the teeth fewer and larger, but of the same general arrangement; in *C. restuans* it is very small, the teeth fine and uniform, deeply grooved basally. *C. sylvestris*, *C. atropalpus*, *C. canadensis*, *C. tæniorhynchus*, *C. sollicitans*, *C. jamaicensis*, *Aëdes fuscus* and *Stegomyia fasciata* have the mentum large, broadly triangular, the teeth usually small centrally, becoming larger toward the base. Dr. Howard called attention to this structure last year; it will probably prove useful in conjunction with the other larval characters, though comparatively difficult to observe.

The paper by Mr. Banks, "New Smynthuridæ from the District of Columbia," was, in his absence, read by title.

* See pp. 147, 148.

NEW SMYNTHURIDÆ FROM THE DISTRICT OF COLUMBIA.

By NATHAN BANKS.

The spring-tails of the family Smynthuridæ are the most interesting forms of the order Collembola. They exhibit considerable diversity in structure and habits, and the species are mostly well marked. Several years ago I reported on the forms found on Long Island, N. Y. Since coming to Washington I have been on the lookout for them, and have taken a number of species, most of which were already known. Three, however, are different from any forms yet known from this country, and their descriptions are presented below:

Dicyrtoma frontalis n. sp.

Head pale yellowish, a broad brown (nearly black) band connecting antennæ and then extending back to the hind margin of the head, above a median black dot; in front across face is a broad brown band, the nasus below it being brighter yellow than the rest of the head; the thorax is pale, black-spotted on sides; abdomen above dark purplish brown, and tubercle more reddish, and showing two pale spots above; basal joint of antennæ dark brown, rest paler brown; legs pale, rather brown on tips of joints; spring pale. Second joint of antennæ long and slender, shorter than breadth of head, third about as long as the second, apparently divided into three subequal portions, last joint short, pointed; abdomen short, high, sloping suddenly behind, above beyond the middle is a distinct rounded tubercle each side, and a slight one in the median line behind; furcula long, the dentes two and one-half times as long as the mucrones, with a few bristles below; mucrones finely serrate below, tip curved downward; a few hairs on head, a few very short ones on posterior slope of abdomen, longer ones on anal tubercle. Length, 1.2 mm.

Washington, D. C., January; under leaves in woods. Readily known by markings of the head.

Smynthurus facialis n. sp.

Head pale brown, with a transverse ivory white band, broadest in the middle and slightly pointed below, extending back below base of antennæ to the abdomen; vertex with pale spots, a row of them connecting the bases of the antennæ; each ocellus surrounded with white; basal joint of the antennæ brown, with a white spot above, second joint brown at base, rest pale. Legs banded, femur with a dark band near the tip, three on tibia. Abdomen above white, the basal part with many small ivory white spots, arranged more or less in three rows, the middle one including a brown line; dorsum beyond the middle with irregular white, brown, and a few larger black spots; anal tubercle above white, with a median black stripe; spring pale purplish; venter pale on apical part, darker on base.

Basal joint of antenna longer than broad, second joint twice as long as first, third one and one-half times as long as the second, fourth as long as the rest together, divided into 18 or 20 subjoints. Abdomen rather long; behind is a prominence each side; dorsum clothed with rather long hairs; furcula of moderate length, the dentes about four times as long as broad at base, with hairs beneath, mucrones about one-third the length of the dentes, finely serrate below. Length, 2. mm.

Washington, D. C., under dead leaves, January. Separated from *S. sylvestris* by the markings of head and antennæ, and dorsum of abdomen.

Smynthurus trilineatus, n. sp.

Pale; head and basal half of abdominal dorsum with three brown stripes, the lateral one passing through eye and base of antenna down upon the face, behind on abdomen they converge toward the middle; the middle stripe, which is narrower and with more even margins, on the head does not extend much beyond bases of antennæ, behind reaching as far as lateral stripes; just beyond the ends of these stripes and across the middle of dorsum is a blackish band, behind which are two large submedian black spots, narrowly connected to a smaller median one behind on the anal tubercle, a few less striking ones on the sides; legs pale; spring pale; antennæ brown. Basal joint of antenna short; the second fully twice as long; third one and three-fourths times as long as the second; fourth as long as rest together, with about 18 annulations; dentes about three and one-half times as long as wide at base, with hairs below; mucrones fully one-third the length of the dentes, finely serrate below. Length, 1.6 mm.

Washington, D. C. Hopping over moss and dead leaves in May.

—Mr. Heidemann read the following paper:

REMARKS ON LIGYROCORIS CONSTRICTUS SAY AND DESCRIPTION OF PERIGENES FALLAX, A NEW SPECIES.

By O. Heidemann.

Some time ago in working on the group Myodocharia of the Family Lygæidæ I found that my material of *Liygrocoris constrictus* Say, from Washington, D. C., Florida and Texas, contained two different forms which I had formerly determined as belonging to one species. The mutual resemblance of the two forms is very striking. Anyone might easily be deceived, and it seems that this has often been the case, as the writer learned later through his correspondence on the subject.

Originally the species was described by Say as *Pamera constricta* from the United States.* Stal placed Say's species in his genus *Ligyrocoris*.† The species of this genus are mainly characterized by having on both sides of the abdomen, at the base, a lunate vitta which is very finely striated and not pubescent.

Among my specimens I found some with a vitta and others without a trace of it. This made it impossible to decide which form really was the species Say had described, since his description fits both forms equally well and since he makes no mention of any vittæ on the abdomen. Unfortunately Say's types have been lost, but many species in the Harris Collection at the Boston Society of Natural History are named by Say, according to Mr. Ph. R. Uhler, who years ago worked up and arranged this collection.‡ Mr. Uhler cites Say's species *Pamera constricta* as belonging to the genus *Ligyrocoris* Stal, referring to No. 122, Harris Collection, Milton, Aug. 15, 1831, "determined as *Pamera constricta* by Mr. Say" (l. c., p. 389). Mr. S. Henshaw, of the Museum of Comparative Zoology, Cambridge, Massachusetts, has been kind enough to compare the two different forms with the specimen in the Harris Collection. His answer reads as follows: "Harris' specimen is badly eaten, but there is enough on one side to show the vitta on that side." This might settle now any doubt as to the determination of Say's *Ligyrocoris constrictus*.

I was puzzled for some time as to where I should properly place the specimens without a lunate vitta, until I found in the Biologia Centrali-Americana a description by Mr. Distant of a new genus, *Perigenes*, based on the new species *P. dispositus* from Guatemala.§ The description of the genus is very short and concise: "Form and shape of Ligyrocoris Stal, but without the lunate vittæ to the under surface of the abdomen; posterior legs shorter; antennæ shorter, the third joint with the apex distinctly incrassated." Following this description I have no hesitation in placing my specimens in this genus, but I venture to describe this form as a new species on account of some differences, even if these are but slight.

Perigenes fallax n. sp.

Body golden pubescent. Head, thorax and side margins of abdomen covered with soft, long hairs. Head, abdomen and humeral angles of

* Say's Entomology of North America, LeConte, I, p. 332.

† Enumeratio Hemipterorum, part IV, p. 146. 1874.

‡ See his paper "Notices of the Hemiptera-Heteroptera in the collection of the late T. W. Harris, M. D." (Proc. Boston Soc. Nat. Hist., XIX., pp. 365-446, 1878.

§ Biol. C.-Am., Hemiptera-Heteroptera, I., p. 396, Pl. 34, Fig. 25, March, 1893.

thorax piceous. Antennæ very hairy, terminal joint sericeous pubescent; basal joint short, second joint longest, about twice the size of the basal one, third joint one-fourth shorter, the ultimate one a little longer than the third; color ochraceous, darker at the tip of joints and at basal part of the first joint. Rostrum dark, reaching to the intermediate coxæ. Sternum, pleural pieces and scutellum dull black, also the thorax, except at posterior margin which is fuscous, smooth and slightly sinuated. Hemelytra dark brown or reddish brown; costal margins ochraceous, at apex clouded, sometimes also before it; at the inner margin of corium are two yellowish white spots. Membrane smoky, at base a few irregular or lunate whitish marks. Lighter colored specimens show near the suture of corium and on the clavus two ochraceous very short lines longitudinally. Legs highly polished, densely set with fine, long hairs, on the tibiæ a few remote spines; front femora beneath at apex with a strong spine, before it a smaller one, color piceous, except at base and tip; middle and hind femora with a broad piceous band before the apex; the base and tip of tibiæ clouded with fuscous, as are also the last tarsal joints. Wings irridescent. In the male, which is considerably smaller, the legs are more or less ochraceous and the femora without a piceous band. Length 5.7 mm.

Type.—No. 6617, U. S. National Museum. One male and one female from Washington, D. C., collected by the author on September 1 and 4, respectively.

This species is widely distributed. I have seen specimens from Buffalo, New York, Texas and Los Angeles, California. It differs from *Perigenes dispositus* Distant in the colors and somewhat, also, in the length of the antennal joints.

The paper was discussed by Messrs. Ashmead and Hopkins. Mr. Ashmead thought that the so-called types of Say in the Harris collection should be accepted as such when they agree with the published descriptions, otherwise not.

DECEMBER 4, 1902.

The 173d regular meeting was held at the residence of Mr. C. L. Marlatt, 1440 Massachusetts avenue, N.W. President Dyar occupied the chair, and Messrs. Morris, Simpson, Busck, Warner, Patten, Uhler, Howard, Schwarz, Pollard, Barber, Kotinsky, Currie, Benton and Stiles, members, and Messrs. H. E. Burke and J. L. Webb, visitors, were also present. The minutes of the last meeting were read and approved.

—Dr. Stiles referred in terms of high praise to the scientific work of the late Major Walter C. Reed, Surgeon in the United

States Army, mentioning in particular his investigations in Cuba as a member of the Yellow-fever Commission with reference to the relation of the mosquito *Stegomyia fasciata* to that disease. He then moved that the Chair appoint a committee of three to draw up suitable resolutions relative to Major Reed and his work, these resolutions to be sent to the family of the deceased and printed in the minutes without further vote by the Society. The motion was carried, and Messrs. Stiles, Howard and Ashmead were appointed subsequently.

The Committee presented the following resolutions:

Resolved, That the Entomological Society of Washington herewith expresses its keen appreciation of the great loss American science, and particularly American preventive medicine, has sustained in the death of Major Walter Reed, Surgeon United States Army. Although not a zoologist, he has been pre-eminent among physicians in making practical application of zoologic knowledge in saving human life, and his discovery and demonstration of the transmission of yellow fever by mosquitoes belonging to the species *Stegomyia fasciata* must take rank scientifically as one of the most brilliant, and practically as one of the most important discoveries ever made in applied zoology.

Resolved, also, That we heartily endorse the idea that Congress be urged to make ample provision for the support of Doctor Reed's widow and daughter. Had Doctor Reed been in private practice or on the faculty of the medical school of an endowed university, his income would have been much larger than that he received in the Army. Had he discovered some mechanical device which could in anyway compare in importance, in saving lives and property, with the discovery he made in regard to yellow fever, he would have realized financial benefits which would have made him a multi-millionaire, and even if Congress should vote an unusually generous pension, the sum could represent only an infinitesimal interest on the money which Doctor Reed's medico-zoological discovery will save this country and other countries.

Resolved, further, That this Society express to Mrs. Reed its sympathy in her bereavement.

CH. WARDELL STILES,
L. O. HOWARD,
WM. H. ASHMEAD,
Committee.

Professor Uhler was then called upon to address the Society. In responding he gave the results of his observations upon the Periodical Cicada in the vicinity of Baltimore, especially during the past season. The cicadas, he said, were first observed on the 27th of May, in Baltimore, in the neighborhood of Druid Hill Park. From that time on they appeared in increasing numbers until the 18th or 20th of June, at which time they were extremely abundant. In fact, he was informed by one whom he regarded as a reliable authority that 39 cart-loads of these insects were carried away from the park grounds.

Professor Uhler stated that he had in his possession two specimens of this cicada collected in 1783. They were given him many years ago by the son of the well-known collector Mr. Wilt, who came to this country in 1782. He also had in his collection, besides the specimens collected during the past season, some examples from the previous appearances of the brood, in 1851 and 1868.

He mentioned the singular fact that he had found this cicada appearing at the same localities every year for five consecutive years after 1885 on the Belair and Harvard roads to the northeast of and within three miles of Baltimore.

In regard to the form *cassinii*, Prof. Uhler said that he had collected large series of cicadas ranging in size all the way from the smallest specimens to the largest of typical *septendecim*, and he had found that the abdominal colors varied. In addition to this the song-notes which were thought to be peculiar to each form were found to be used by both. There no longer, therefore, appeared to him any reason for considering the form *cassinii* as valid. *Cassinii* has been reported as appearing somewhat later than typical *septendecim*, but he had found it throughout the season, both early and late, and he thought it noteworthy that he had found it at Pen Mar, Maryland, as late as the early part of August.

Speaking of the mounds or turrets, Prof. Uhler said that those he saw differed from Prof. Riley's published figures in that the hole of emergence was never at the side or bottom, but always at the top. The turrets were found only in certain localities and under hemlock and balsam, *not* under oak trees.

Mr. Marlatt said that he agreed with Prof. Uhler as to the in-

validity of the form *cassinii*. He also had always found the hole at the top of the turret and never at the side. He referred to his notes on the periodical cicada given at the meeting last June and the general discussion of these insects which then took place. He stated that Mr. Wm. T. Davis collected specimens of this cicada upon Staten Island nearly every year.

Prof. Hopkins said he had been led to believe that *septendecim* appears every year in certain localities of West Virginia.

Mr. Schwarz stated that he had seen the turrets from Missouri from which the figures published by Riley were made. He remembered that several of them had a hole on the side as shown in the figure. There was no brood of this cicada, he said, on the Rio Grande in Texas, though it had twice been recorded from there. Both these records, however, were based upon another species, which comes up in enormous numbers in that part of the West at the time that *septendecim* emerges in the East. He mentioned the fact that Prof. John B. Smith had observed a certain species ovipositing in a rotten stump. The species found at Williams, Arizona, Mr. Schwarz said, oviposits in oak twigs, and is as fatal to the twigs as is our *septendecim*.

—Mr. Morris called the attention of the Society to a work entitled, "Galls and the Insects Producing Them," by Melville Thurston Cook, parts I and II of which have recently appeared as Bulletin No. 15, Series 6, of the Ohio State University.

—Dr. Dyar showed mosquito larvæ collected by Messrs. Schwarz and Barber at Williams, Arizona, early in June, 1901. It is probable that they are *Culex incidens* Thomson, since the imagoes of this and *C. varipalpus* Coquillett were the only species taken at that place, and the latter is a small fly, not attributable to this large larva. The larva belongs to the short-tubed group, and is allied to *canadensis* and *atropalpus* by its large comb of the eighth segment consisting of a large patch of many little spines. It differs from these species and also from all other mosquito larvæ yet seen by the pecten of the air-tube being formed of a row of hairs instead of the usual short-toothed spines.*

* Since this note was read, apparently the same species of larva has been received from Messrs. Dupree and Morgan, labelled *Culex consobrinus*. *Consobrinus* occurs in Arizona in all probability, since the National

—Mr. Schwarz exhibited specimens of the Ptinid beetle, *Trigonogenius farctus* LeConte, from San Francisco, Cal., and *T. globulum* Solier, from Chili, in order to prove the specific identity of the two. He called attention to his note published in the Canadian Entomologist, where the habits of the species were mentioned. It has been found in red pepper and other drugs in California and British America, and he had at that time called attention to the fact that the species was probably an introduced one. He also called attention to a note in the Entomologists' Monthly Magazine for March, 1900, where Mr. B. Tomlin records the occurrence of this species in England among refuse of grain.

—Mr. Marlatt recalled a communication presented by him before the Society several years ago, in which he pointed out the danger of describing as new species specimens of scale insects which varied in color only from old species. As illustrating the wide range of such variations he exhibited some specimens of the San José scale. One of these was a peach twig recently received from a correspondent, completely massed and covered with scales, most of which were of a chalky or almost snow-white color. This was especially notable on the side of the limb most exposed to the sun, and all of the scales on the limb, underneath as well, were much whitened. If the character of color were given relative value in this case it would result in a distinct species, if not a new genus. On this twig were patches where the scale presented nearly the normal appearance, and in other places were all the variations between the white and the normal color of the scale. He also exhibited some pear leaves on which the San José scale, chiefly male scales, were of a very light buff, and stated that he had noticed during the summer that the insects that went out on the leaves developed scales of this color in life, a characteristic which is widely divergent from the normal type of the species, and would never be recognized as belonging to the San José scale. More striking examples of wide variations in color of a scale he had never seen, and both of these specimens illus-

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Museum has specimens from New Mexico and Chihuahua, whereas *incidens* is unknown in the East. Therefore, *consobrinus* is a more probably correct identification of Messrs. Schwarz and Barber's larvæ.

Consobrinus belongs to the short-tubed group only by reversion in the last stage, as will be more fully discussed elsewhere.—H. G. D.

trated the danger of depending on color for the identification of species or for characterization. In this case it was especially notable because the San José scale is, as a rule, rather uniform in its colorational features.

—Then Dr. Howard, under the title "Gossip about a European Trip, more or less entomological," gave a rapid but entertaining outline, illustrated by numerous photographs, of his travels in Europe during the past summer, particularly in France, Italy, Austria, Germany and Holland. He gave his impressions of the various entomological and other scientific institutions visited, of their work and of the workers themselves. Among many items of interest may be mentioned his account of the precautions taken in the malaria-infested regions of Italy to protect the inhabitants from mosquitoes.

At the conclusion of Dr. Howard's talk, Mr. Schwarz asked him if he agreed with the statement which Mr. Marlatt had made upon returning from his European trip, that injurious insects were much less numerous in Europe than in our country. Dr. Howard replied that he did, most emphatically.

—Mr. Caudell presented the following paper for publication:

SOME NEW OR UNRECORDED ORTHOPTERA FROM ARIZONA.

By A. N. Caudell.

In a collection of seventeen species of Orthoptera, received from Dr. R. E. Kunze, of Phoenix, Arizona, occur two new species and a few others of considerable interest by reason of their rarity or by their having been previously unrecorded from that Territory. Following is a list of the species represented, together with descriptions of those which are new.

Orphulella compta Scudd.
Ligurotettix kunzei sp. nov.

Head large; fastigum moderately sulcate, more so in the male, very slightly carinate centrally, or there tumescent; lateral foveolæ quadrate; frontal costa flat, very slightly sulcate just below the ocellus, broad, nearly as wide as the interspace between the eyes. Eyes prominent, a little elongate, slightly longer than the infraocular part of the genæ. Antennæ slightly thickening distally, apically acuminate, longer than the head and pronotum. Pronotum widening irregularly from in front backwards, obtusangulate behind, subtruncate in front; median carinæ

persistent, less distinct between the sulci; lateral carina present only posterior to the principal sulcus; lateral lobes vertical, the posterior angles rounded. Elytra and wings slender, reaching about one-fourth of their length beyond the end of the posterior femora. Hind femora considerably compressed, the upper margin more curved than the inferior.

Color—brown, mottled quite uniformly with fuscous, lighter in the male and much less maculate with fuscous, almost uniformly light grayish-brown. The head has an obscure postocular band and the upper part of the lateral lobes is somewhat infuscated, scarcely so on the metanotum, scarcely noticeable in the male. Abdomen much lighter in color than the rest of the body. Elytra in the female considerably flecked with fuscous, in the male almost immaculate. Posterior femora brownish externally, paler towards the tip, except the upper half of the genicular arc which is piceous, internally the geniculation is wholly black and the face is marked with one distinct and one imperfect black band dividing the surface into three nearly equal parts, the imperfect band being basal and not showing on the dorsal surface of the femora, while the perfect band continues over the dorsal surface and slightly onto the outer face, neither band showing in the ventral sulcus, which is uniformly light brown. Hind tibiæ dull yellow with a small black spot at either extremity below.

Length, body, ♂, 17 mm., ♀, 24 mm.; antennæ, ♂, 6 mm., ♀, 6.5 mm.; elytra, ♂, 16 mm., ♀, 21.5 mm.; hind femora, ♂, 9 mm., ♀, 11 mm.

Type No. 6705, U. S. National Museum.

One male and one female from Phoenix, Arizona, collected September 10, 1902.

This species is very like *Ligurotettix coquilletti*, but is much more slender, lighter in color, and the posterior femora are not so distinctly banded above. The measurements are also considerably greater.

Encoptolophus subgracilis sp. nov.

Head moderately large, about as broad as the posterior part of the pronotum; eyes quite prominent, about as long as the infraocular part of the genæ and generally with a more or less distinct fuscous band running horizontally across the middle, especially in the male. Vertex about as broad as one of the eyes, furnished posteriorly with a very distinct carina, the margins well elevated, converging in front to form the sides of the frontal costa, which is moderately narrow, approximately half as broad as the interspace between the eyes, equal in the female, narrowing apically in the male, quite deeply sulcate, especially at the ocellus, and below just failing to reach the clypeus. Antennæ short, very slightly broadening apically, at least in the female. Pronotum more slender than usual in this genus, broader behind and with the lateral lobes almost perpendicular and more angulate behind than usual in allied species; median carina better developed than in *pallidus*,

the nearest allied species, but in no sense cristate, evenly elevated and cut slightly before the middle; lateral carina distinct, fading anterior to the principal sulcus. Elytra and wings of equal length, considerably surpassing the posterior femora, the elytra more slender in proportion to their width than usual in members of this genus. Posterior femora broad basally, about equally rounded above and below, not or but little passing the tip of the abdomen in either sex, the carinæ well elevated.

Color—dark brown, mottled with fuscous. Head dark brownish, fuscous above, somewhat lighter on the sides and in front and furnished with an obscure postocular band, which, especially in the male, extends across the middle of the eye. Pronotum colored as the head with the inferior border of the lateral lobes lighter. Abdomen light yellowish brown, somewhat infuscated basally above. Elytra with the usual fuscous markings but somewhat less conspicuous than usual. Wings hyaline with the stigma deeply infuscated. Posterior femora quite uniformly brown externally with a somewhat obscure pallid pregenicular annulation; internally black with two light bands, one preapical and one median. Hind tibiæ greenish blue, the basal third pallid.

Length, body, ♂, 18 mm., ♀, 25 mm.; antennæ, ♂, ?, ♀, 6 mm.; elytra, ♂, 16 mm., ♀, 19 mm.; hind femora, ♂, 10 mm., ♀, 12 mm.

Type No. 6704, U. S. National Museum.

Two males and one female from Phoenix, Arizona, collected October 27, 1902.

This species is most nearly allied to *Encoptolophus pallidus* Bruner, from California, but the color is darker, in this regard standing between that species and *costalis*, and the general form is much more slender. It differs from *costalis* in its slenderer form, less conspicuously marked elytra and smaller size. When a number of specimens are examined there will probably be some variation found to exist in the length of the antennæ, this being the case with *E. pallidus*.

Trimerotropis vinculata Scudd.
Conozoa behrensi Sauss.
Anconia integra Scudd.
Schistocerca shoshone Thom.
Schistocerca vega Scudd.
Melanoplus aridus Scudd.

There are nine specimens of this species in the collection and one, a female, is quite noticeably tinged with green.

Melanoplus brownii Caud.

These specimens, eleven in number, agree with the type specimens except that the posterior tibiæ are bluish in color. The tibiæ of the types may have been faded in color.

Melanoplus differentialis Thom.
Melanoplus flavidus Scudd.

Melanoplus herbaceus Scudd.
Melanoplus pictus Scudd.
Melanoplus yarrowii Thom.

This species is represented by eighteen specimens, several of which are tinged with greenish.

In a small collection of Arizona Orthoptera, made by Mr. E. A. Schwarz some years ago, mostly in Madera canyon in the Santa Rita Mountains, are some quite interesting forms. The most interesting of these are here noted.

Vates sp.

An immature specimen belonging to the genus *Vates* occurs in the collection. It is too young to permit of a specific determination, but there is no doubt of its belonging to this genus.

Litaneutria spp.

In this collection occur six male specimens belonging to the genus *Litaneutria*. They evidently represent two species, but the condition in which the species of this genus have been left by Professor Scudder's insufficient descriptions* makes their determination impossible without an examination of the type specimens.

Ischnoptera uhleriana Sauss.

A male from Madera canyon is somewhat larger than those commonly taken in the East, measuring 18 mm. in length of elytra.

Latindia schwarzi sp. nov.

Testaceous, head brown. Thorax transversely elliptical. Elytra long, veined as in *L. delicatula*. Wings hyaline with an opaque infuscated area beyond the middle of the costal margin, at rest reaching slightly beyond the tips of the elytra. Cerci about as long as the pronotum, curved so strongly downwards as to almost form a circle.

Length, pronotum, 1.5 mm., elytra, 7 to 8 mm., width, pronotum, 2.25 mm.

Type No. 6706, U. S. National Museum.

Three male specimens from Madera canyon, Santa Rita Mountains, collected June 8 and July 7, 1898.

This species is very closely allied to *L. delicatula*, from Guatemala, the main differences seeming to be the longer wings and the less infuscated state of the under wings.

Myrmecophila formicarum Scudd.

Two specimens of this species were taken in Madera canyon with *Camponotus sp.* This seems to be the first published record of any species of this genus being taken in Arizona.

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* Can. Ent., XVIII, p. 209, 1896.

Œcanthus argentinus Sauss.

Specimens of what I take to be this species were taken at Oracle, Arizona, and also at Hot Springs, by Mr. H. S. Barber. These specimens have a single straight line on the inner side of the first and second segments of the antennæ, and the wings are caudate. From the original description and the later treatment of the species by its author in the Biologia Centrali-Americana there appears to be considerable variation in the length of the wings and the markings of the antennæ. There is some variation in the antennæ of the specimens before me, some having unicolorous antennæ with scarcely a mark except the straight dash on the two basal segments, while others have several segments beyond the second deeply infuscated and the markings on the first and second segments of variable distinctness.

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FRANK BENTON, Corresponding Secretary,
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JANUARY 8, 1903.

The 174th regular meeting was held at the residence of Dr. H. G. Dyar, 1512 Twenty-first street, N.W. Dr. Dyar presided, and Messrs. Schwarz, Benton, Kotinsky, Quaintance, Marlatt, Heidemann, Barber, Caudell, Busck, Patten, Simpson, Hunter, Hopkins, Gill, Banks, Warner, and Currie, members, and Messrs. Hinds and Burke, visitors, were also present.

The following officers were elected for the year 1903: President, Mr. D. W. Coquillett; First Vice-President, Mr. Nathan Banks; Second Vice-President, Dr. A. D. Hopkins; Recording Secretary, Mr. Rolla P. Currie; Corresponding Secretary, Mr. Frank Benton; Treasurer, Mr. J. D. Patten. Additional members of the Executive Committee: Dr. H. G. Dyar, Dr. L. O. Howard, and Mr. C. L. Marlatt.

Mr. W. E. Hinds, Field Agent in the Division of Entomology, U. S. Department of Agriculture, was elected a corresponding member.

The retiring President, Dr. Dyar, then delivered his annual address, as follows:

ANNUAL ADDRESS OF THE PRESIDENT.

SOME RECENT WORK IN NORTH AMERICAN LEPIDOPTERA.

By HARRISON G. DYAR.

Ten years ago the classification of the Lepidoptera stood essentially as in the time of Linnæus. In Smith's list of 1891 we still have the two large divisions into Rhopalocera and Heterocera, the former corresponding to Linnæus' Papilio, the latter to his Sphinx and Phalæna. While the Sesiidæ and Syntomidæ, placed in Sphinx by Linnæus, have been removed from that group, they were still found immediately following it. Some suggestions on right lines have been made from time to time, such as that of Butler, who, many years ago, claimed a position in the Tineids for the Sesiidæ; but such suggestions have not been generally followed.

Recently it has been shown that the classification of the Lepidoptera must be materially changed to accord with the probable evolution of the families and genera. Fortunately the general order of Linnæus will not have to be greatly modified. The transference of a few families and a division of the group called Phalæna by Linnæus will suffice. The studies of Meyrick, Hampson, Chapman, and Tutt in England, and of Comstock, Packard, Kellogg, Bodine, and the writer in America, have converged to a common general scheme, though the details still differ in the conception of the several authors. This general subject is so fully discussed by Tutt (Brit. Lep., I, chapter ix, 1899) that I will not enter upon it further, but refer to the more special work accomplished by American students.

The last decade has seen the close of the labors of two great students of the butterflies, S. H. Scudder and W. H. Edwards. Dr. Scudder's work is widely recognized as most excellent. It is extremely full in detail and accurate, even in points to which attention had not at the time been directed. If we may presume to criticise this master of his study, we would say that the chief faults are, first, the use of too small characters in defining genera and groups, characters which are either variable or not easily appreciated, together with a certain indefiniteness in synoptic tables which renders them difficult to use; second, generalizations from too few known species, causing specific characters to appear as those of higher groups.

Mr. Edwards has been first and foremost a describer of species. He is responsible for the bulk of the specific names of North American butterflies. That he carried his work too far and named as species a number of forms of only varietal or racial rank is probably true, yet it is difficult to point out just what names should be united. The difficulty is especially apparent in the genus *Argynnis* with its great variety of forms and their almost imperceptible differences. Mr. Edwards named everything in this genus as a species which differed, however slightly, from his known specimens. Nearly everyone agrees that there are too many names, but no two will agree which names are of varietal rank. Mr. H. J. Elwes, of England, tried to improve the names, and later Mr. A. J. Snyder has attempted the same thing. Both seem to have failed. Mr. Edwards not only published descrip-

tions, but most excellent figures of his species. To this is added his widely known work on the larvæ, in which many points of both special and general interest appear. His chief fault is that he never correllated his work. He never published any synoptic tables, though his work is partly systematized by his catalogue. Neither by any one else have the North American butterflies been properly placed together and studied. Scudder's remarkable work covers only the Eastern species, and G. H. French's very excellent little book (published in 1886) has the same range. Dr. W. J. Holland's "Butterfly Book" covers the field, but it is adapted only for beginners, being essentially a picture-book with lamentably meagre text. In nomenclature the greatest possible difference exists between Scudder and Edwards. Scudder applied the rule of priority to generic names rigidly and fully and made many genera. Edwards disregarded the law, using any generic name that happened to be current, and made few genera. In the future a middle course between these courses will probably be adopted. More genera than Edwards recognized will be used, less than Scudder recognized; while the law of priority will have to be followed.

After Scudder and Edwards there remain but few special students of North American butterflies. Dr. Henry Skinner has a good collection, and he has published a paper on the genus *Cœnonympha*, which, if followed by others, would give a monographic treatment of our butterflies which is much needed. But Dr. Skinner has not evinced a disposition to follow up this work with vigor, and he has not studied the larvæ, a prime requisite for a specialist in the group. Mr. Wm. Beutenmüller has given a good paper on the old genus *Anthocharis*, though he is not specially a student of the butterflies.

In the Sphingidæ almost nothing has been done in the period we are considering. Mr. Beutenmüller has published the life histories of some species, but his descriptions are altogether too brief. Dr. Packard has given us a few life histories and pointed out the good field awaiting the student who would study our larvæ on the lines laid down by Weismann and Poulton; but no one has seriously attempted this.

In the Saturnians scarcely more has been done than in the Sphingidæ. Mr. Neumoegen and the writer "revised" the

group, Grote has published a work in Germany which refers to American species, and Packard has published on the larvæ, giving details of their peculiar structure and armature. He is still at work on the Saturnians, as a continuation of his monumental work on the "Bombycine Moths," of which the Notodontidæ formed the first part, so that the next few years will probably see a great advance in this group. The title of Dr. Packard's work reminds us that we wish it were founded on a better system of classification. Packard's own system is open to criticism, viewed either from a venational, pupal, larval, or oval standpoint, and we regret to have such an excellent and comprehensive work proceed on a somewhat uncritical foundation.

Sir George Hampson, of England, in his studies on moths, and especially in the "Lepidoptera Phalænæ," the series of monographs of the world fauna being published by the British Museum, incidentally treats of American species. We think his work the best of its kind that we have studied. It suffers a little from haste, more especially in his earlier papers, and from the use of characters which are subject to variation, especially the smaller differences in venation. In using his book to determine Syntomidæ we have been occasionally misled, even so far as to make synonyms, owing to these defects.

The last ten years of American entomology have been nearly uninfluenced by the personality of Mr. A. R. Grote. Since he took up his residence abroad he has been unable to contribute much to our subject. Formerly the leading student of North American Noctuidæ he has lately turned his attention to more general studies. How much we have lost in the expatriation of this able man, with his clear and concise statements and his almost intuitive perception of specific characters, it is hard to say. His place has been taken by Dr. John B. Smith, a patient, careful man, who has given lengthy descriptions of numerous new species, usually accompanied by synoptic tables and a revision of the group to which they belong. We are fortunate to have this work done in so capable a manner. Yet two tendencies in the work may be criticised. The descriptions are often vague from the very effort at completeness, and this vagueness is increased by the too discursive character of the introductory remarks accompanying the revisions of groups. The synoptic tables seem somewhat

overdone. I would not say that the characters used are sometimes imaginary, yet they verge upon this definition. Certainly it is at times difficult for the general student to appreciate them when he has the specimens before him. As written they always seem to present good contrasts. Dr. Smith has not cultivated a knowledge of larval forms, and his work is not checked by breeding. This renders his idea of a species the more likely to become mechanical and lead him to describe as species forms not entitled to that rank.

The Notodontidæ have been ably monographed and the result beautifully published, at Government expense, by Dr. A. S. Packard, a world-renowned zoologist. Dr. Packard has treated his subject in the broadest possible manner, making great generalizations and deducing philosophical arguments from his study of these moths. The work is in general commendable, though we have ventured to pick some small faults. We cannot but regard it as a pity that Dr. Packard should waste his philosophical arguments in trying to prove the transmission of acquired characters and the direct effect of the environment on structure. This seems to us so much lost labor. For practical use his monograph suffers from the weakness of the synoptic tables, as we have had occasion to remark (Can. Ent., xxviii, 189, 1896). Somehow Dr. Packard seems never to become personally acquainted with the species of which he treats, if I may use such a term. This may be due to lack of time or to too equal reliance on information furnished by persons of varying responsibility; but, whatever the cause, it leads him to be able to commit such errors as describing the same larva as that of two different moths and never detecting the incongruity.

Dr. Packard's early studies on Geometridæ hardly come within the range of our present view. His successor has been Dr. Geo. D. Hulst. Dr. Hulst has published many new species and genera, and has revised the family with full generic tables. His work, undoubtedly brilliant in certain respects, is seriously marred by his habitual carelessness. Nothing that Hulst has done can be absolutely relied upon, for fear that a thing, apparently most evident, may be found to be vitiated by some blunder that he knew much better than to commit. It is a pity that his types are not with some student able and willing to go over and verify his

work. Once verified, it would become thoroughly valuable. Dr. Hulst favored the use of secondary sexual characters, and he not only employed them in generic definition, but used them as prime characters in his synoptic tables. This is an inconvenience in practice, for a species cannot be named unless both sexes are at hand in the material for determination, which is often not the case. However, this did not prevent Dr. Hulst from founding new genera on a female specimen only. He simply supplied the missing male characters from his fertile imagination (*e. g.* genus *Pterotæa*, Trans. Am. Ent. Soc., xxiii, 349, 1896). Yet in spite of defects, Dr. Hulst is badly missed, for he leaves no successor in the study of the Geometridæ.

In regard to the higher Tineids, the Pyralids have received very little attention. We have had no student devoting himself to them as a specialty. Fortunately Dr. C. H. Fernald is now engaged in this study, though his work is as yet unpublished. Dr. Hulst published sundry new species in the Phycitinæ. His article on this group was published in 1890, and hardly comes within our view. It has been followed by the first part of Ragonot's great work, published in the Romanoff Memoirs, which includes the Phycitinæ of the world. We have not studied the subject enough to be able to criticise this book. The Crambinæ and Pterophoridæ have been acceptably treated by Dr. Fernald in small separate publications. We do not like the use of a series of alternatives based on shades of color, as in the separation of the species of the genus *Pterophorus*. But in general the work serves admirably for the purposes of determination. The Tortricidæ have remained practically untouched for ten years, only certain new species having been described. In the Tineids, Lord Walsingham's work on the North American species has gradually ceased. His work is so excellent that it may well serve as a model to our future workers, both in its careful accuracy and its conservatism. With its cessation there seemed at first no successor, but lately three men have taken up the subject, Dr. W. G. Dietz, Mr. W. D. Kearfott and Mr. August Busck. Their work is as yet too small in quantity for much criticism, but seems to have been begun rightly. We fear that Dr. Dietz has a tendency to make species on too small characters, judging by his *Pigritia* paper. Mr. Kearfott, too, has

shown something of the same tendency in his first paper. The next few years will certainly show marked advances in our knowledge of the Tineids.

This review indicates that we need certain work in the immediate future. A monograph of the Butterflies with practicable sypnotic tables, critically revising both genera and species; comprehensive work on the larvæ of the Sphingidæ; studies on the larvæ of the Noctuidæ to supplement Dr. Smith's work on the adults, which should be continued; a review of Dr. Hulst's work on the Geometridæ, which might most profitably take the form of a monograph, giving practicable sypnotic tables to species to supplement Dr. Hulst's generic ones; determinative tables for Tortricidæ, both generic and specific. Dr. Fernald ought not to delay the preparation of such a badly needed paper; continued descriptions of new species of Tineids to make the extent of our fauna known to us. We hope to see these subjects soon taken up.

At the conclusion the society offered Dr. Dyar a vote of thanks for his address. The address was discussed by Messrs. Schwarz, Banks, Gill and Marlatt.

—Mr. Banks then presented the following paper:

NOTES ON BRACHYNEMURI OF THE B. FEROX GROUP.

(Plate III.)

By Nathan Banks.

In examining some recent additions to my collection of Myrmeleonidæ, I was struck more forcibly than ever before with the constancy in size and shape of the male appendages. Various species are now known to me from a considerable number of localities, yet there is no distinct variation in the general appearance of these appendages. Therefore it seems that they are of considerable importance in the separation of species. In the *B. ferox* group I have had various specimens that differed from the known forms very slightly in colorational points but prominently in the appendages; therefore I believe these forms are distinct species.

Two are from the United States, a third is from Baja California, and was formerly considered *B. peregrinus*, but is very distinct from that species. The following table will separate these allied forms:

1. Superior appendages very long and slender, more than one-half the length of last abdominal segment...... 2
   Superior appendages much shorter, scarcely as long or shorter than one-half the last abdominal segment...................... 4
2. Superior appendages as long as last abdominal segment, yellowish, apical abdominal segments without pale marks..........*B. carrizonus.*
   Superior appendages shorter than the segment, often blackish. 3
3. Superior appendages plainly shorter than last abdominal segment; apical abdominal segments without pale marks.................*B. assimilis.*
   Superior appendages nearly as long as segment, black, abdomen spotted with pale throughout...... ....*B. dissimilis.*
4. Cubitus heavily marked with black; pronotal stripes connected in front; femora black above; superior appendages black..................*B. ferox.*
   Cubitus not heavily marked with black; thoracic stripes not connected in front; smaller species................. 5
5. Femora thickly dotted with black; superior appendages blackish; vertex not with four dots.................. ....*B. texanus.*
   Femora wholly pale; superior appendages yellowish; vertex with four black dots........................... ....*B. 4-punctatus.*

Brachynemurus assimilis, n. sp.

Face yellow, a transverse black spot from eye to eye, including bases of antennæ, and limited above by a curved black band, the lower margin pointed in the middle; vertex pale, with a brown band, interrupted in the middle and not reaching the eyes. Prothorax yellowish, with four black stripes at subequal distances apart and all reaching anterior margin, the pair each side sometimes connected in front; lower margin with black stripe. Palpi tipped with black; antennæ brown, quite long. Rest of thorax lineate and maculate with black, two stripes on meso- and metascutellum. Legs pale, more or less heavily spotted with black, the tips of the tibiæ and tarsi black. Abdomen pale at base, lineate with black, beyond middle black. Wings hyaline, venation interrupted black and white; pterostigma pale, with a basal brown spot; the cubitus quite heavily marked with brown (but not so much as in *B. ferox*). The abdomen of the male is very long, longer than in allied species, the superior appendages very long and slender, about as long as in *B. carrizonus*, but the last abdominal segment is very much longer than the appendages.

Length ♂, 57 mm.; ♀, 34 mm.

Four specimens from Tehama, California, August (Morse), and from Oregon. Closely allied to *B. carrizonus*, but differs

by the greater length of the male abdomen, and also by the shape of the inter-antennal mark, which is not plainly transversely divided above antennæ, and is pointed on the median line below.

Brachynemurus carrizonus Hagen.

All my specimens (15) have the appendages as Hagen describes them, about as long as the last abdominal segment. The inter-antennal mark is transversely divided above the antennæ, and the lower margin is not pointed on median line.

Brachynemurus ferox Walker.

B. peregrinus Hagen.

I have compared the descriptions of Walker and Hagen with specimens from California, Oregon, Washington, Nevada, and Arizona, and think there cannot be the slightest doubt of the synonymy.

Brachynemurus dissimilis, n. sp.

Face pale yellow, a transverse black spot from eye to eye extending more below antennal bases than in *B. assimilis* or *B. carrizonus*, above cut off by a pale band from the curved black band on front margin of vertex; latter with a dot and line each side; palpi tipped with black; antennæ long, brown; prothorax with four black stripes and side margins black, not connected in front; rest of thorax marked with black, two stripes on meso- and metascutellum. Legs pale, lightly dotted with black, and the tibiæ and tarsi black-tipped; legs more slender than in allied forms. Abdomen pale at base, lineate with black, beyond middle black, but with a distinct yellow spot on posterior margin of each segment on each side in both sexes. Wings marked as in allied forms, the cubital marks not very heavy. Abdomen long and slender, the last segment, however, not as long as in *B. assimilis*, the superior appendages long and slender, black, and curved toward each other, plainly a little shorter than last abdominal segment.

Length, ♂, 39 mm.; ♀, 25 mm.

Habitat, San José del Cabo, Baja California. This is the species that I had previously considered *B. peregrinus* in my paper on the Neuroptera of Baja California.

Brachynemurus texanus, n. sp.

Face yellowish, a transverse inter-antennal mark, concave on lower margin, separated by a yellow band from the black band on front margin of vertex; the latter with a triangular mark each side; palpi tipped with black; antennæ pale brown. Prothorax with four black lines, somewhat broken in male; rest of thorax maculate with brown, two stripes on meso- and metascutellum; legs heavily dotted with black, tibiæ and tarsi tipped with same. Wings marked as in allied species. Abdomen pale at base, lineate with black, black beyond middle, but with pale spots on the pos-

terior margin of some of the segments. Last abdominal segment of male quite long; the superior appendages short, divaricate, black, not half the length of the segment.

Length, ♂, 33 mm.; ♀, 25 mm.

One pair from Laredo, Texas, August (McClendon).

Brachynemurus 4-punctatus Currie.

This species is very constant in markings, as Mr. Currie has already noted; however, I think it is closely allied to the other species by the structure and general plan of markings.

Explanation of Plate III.

1. *Brachynemurus assimilis*, inter-antennal mark and superior appendage of male.
2. *Brachynemurus carrizonus*, inter-antennal mark and superior appendage of male.
3. *Brachynemurus dissimilis*, inter-antennal mark and superior appendage of male.
4. *Brachynemurus ferox*, pronotal marks and superior appendage of male.
5. *Brachynemurus texanus*, pronotal marks.
6. *Brachynemurus texanus*, superior appendage of male.
7. *Brachynemurus 4-punctatus*, superior appendage of male.

The paper was discussed briefly by Mr. Currie. He mentioned the fact that many species which differ widely in other respects often have very similar anal appendages and, *vice versa*, there are some species which resemble each other very closely *except* as regards the appendages. He said that, according to his own observations, there is considerable individual variation, in some species, both in the length and shape of the inter-antennal marking. Mr. Banks replied that, though there is some variation in length, he has found the shape fairly constant in the species he has studied. The paper was further discussed by Messrs. Schwarz and Gill.

February 19, 1903.

The 175th regular meeting was held at the residence of Mr. John D. Patten, 2212 R street N.W. In the absence of the

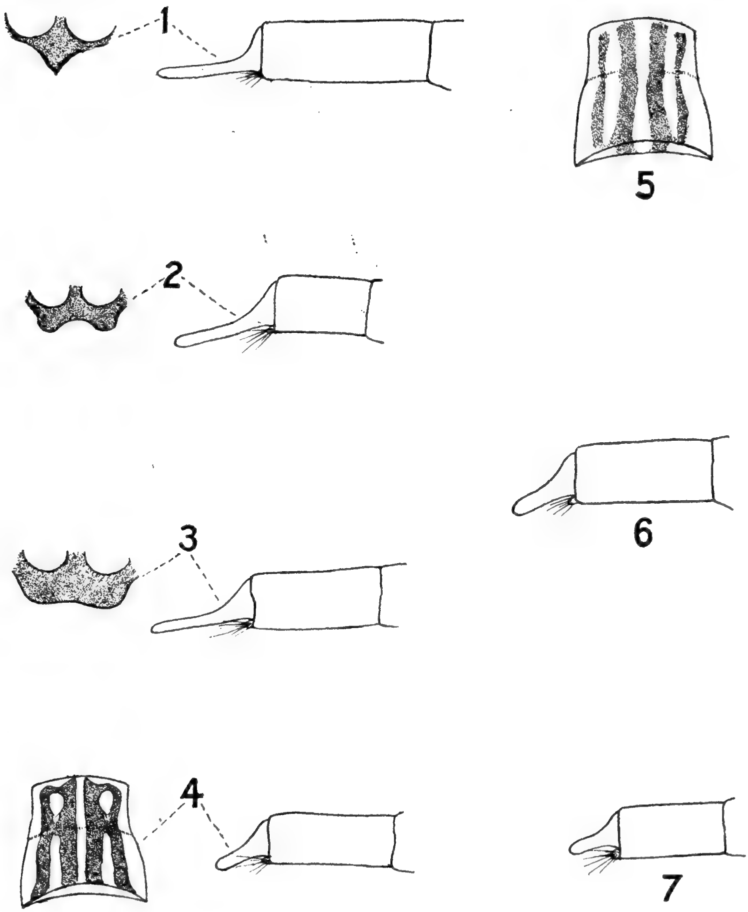

PLATE III.

President and both Vice-Presidents, Mr. Patten presided, and there were also present Messrs. Gill, Marlatt, Benton, Currie, Warner, Barber, Doolittle, Simpson, Dyar, Kotinsky, Howard, Pollard and Ashmead.

Mr. Ashmead was elected Vice-President of the Washington Academy of Sciences for the Entomological Society.

Mr. Ashmead exhibited both sexes of two species of wasps from Chile, from the collection of Mr. E. C. Reed. The first was labeled *Agenia xanthopus* Spinola. Both male and female possess very short wings. This species is a synonym of *Pompilus gravesii* Haliday and will fall into the genus *Sphictostethus* of Kohl. The other species shown was *Cosila chilensis* Spinola, the type of Mr. Ashmead's family Cosilidæ. Mr. Ashmead pointed out that the genus *Cosila* could not belong to the Scoliidæ on account of important differences in venation, and because the hypopygium of the male is unarmed.

—Dr. Dyar exhibited specimens of a new genus and species of Geometridæ, and presented descriptions as follows:

A NEW GENUS AND SPECIES OF GEOMETRIDÆ.

By Harrison G. Dyar.

Hulstina, n. gen.

Male antennæ bipectinate, the pectinations shortening at the apex, the last three or four small joints without pectinations, but no distinct bare tip; of female short, serrate. Wings without perceptible fovea below in either sex; hind tibiæ of male not enlarged, without hair pencil; two pairs of spurs. Palpi short, scaled, tongue obsolete, front smooth. Thorax and abdomen smooth, scaled, tip of male abdomen slightly tufted. Venation as described by Hulst for *Æthalodes*, with which this seems to coincide, but the name *Æthalodes* is a homonym, having been used by Krieschbaumer in 1890, as pointed out to me by Professor Cockerell.

Hulstina terlineata, n. sp.

Resembles *Alcis obliquaria* Grt., but is even more like *Cleora formosata* Hulst, as identified for me by Dr. Hulst; but that species has a distinct tongue.

Whitish gray, sprinkled with black; abdominal segments edged with white behind. T. a. line black, oblique, preceded by a light brown band, not reaching costa. Median line faint, oblique, present only on the inner half of the wing in the restricted median space; a small black discal dot. T. p. line black, oblique, curved a little, from the middle of the inner margin to the outer fourth of costa, which it does not quite attain; edged

without by a light brown band. Terminal space darker, containing a white, powdery, scarcely dentate, subterminal line. Margin narrowly black; fringe white with two black lines. Hind wings gray without basal markings, or a trace of a line across the obscure discal dot; three faint parallel dark lines outwardly, the center one brownish, the others dark gray; fringe as on fore wing, the margin slighly scalloped. Beneath uniformly pale gray with trace of discal dot and common mesial line. Expanse 22 to 25 mm.

Type.—No. 6735, U. S. National Museum.

Five specimens, Stockton, Utah (O. C. Poling), July 1 and 30, 1902.

—Dr. Dyar presented for publication the following synoptic table and description of a new species:

NOTE ON THE NORTH AMERICAN WHITE-MARKED SPECIES OF EUCOSMA.

By Harrison G. Dyar.

The North American species of the Tortricid genus *Eucosma* (*Pædisca*) which have conspicuous silvery white spots, may be separated as follows:

Markings of fore wing transverse, the spottings as broad as long or more so.
- A median transverse white band.
  - Basal spot followed by an upright bar ....*robinsonana* Grt.
  - Without this bar... ...*quinquemaculana* Robs.
- No median transverse band....................................*adamantana* Guen.

Markings longitudinal or oblique.
- Without a serpentine band on the disk.
  - Median bar unbroken from base to margin...............*crambitana* Wals.
  - Median bar not unbroken.
    - Median bar reaching middle of wing.
      - Wings marked with broad spots.
        - Spots distinct, silvered, sharp edged .... *ridingsana* Robs. *fernaldana* Grt.
        - Spots diffused, white, ill defined....................*morrisoni* Wals.
      - Wings marked with narrow silver streaks.........*argenteana* Wals.
    - Median bar absent; markings oblique..................*ragonoti* Wals.
- With a serpentine white bar on disk.
  - This bar on center of wing, forming a continuation of basal streak.
    - A white spot on internal margin.
      - Serpentine bar separated from base, often joining internal margin...*bolanderana* Wals.

Serpentine bar joined to base ....*agassizii* Robs.
A long bar on internal margin............................ *gilletteana* Dyar.
This bar on lower median field.
Bar from internal margin near base returning to margin near anal angle.......................................*serpentana* Wals.
Bar along median fold to near anal angle, then upward along outer margin to near apex.............*optimana* Dyar.

I fail to find any character in the description to separate *fernaldana* Grt. from *ridingsana* Robs. On the other hand, *robinsonana* Grt. and *quinquemaculana* Robs., united by Prof. Fernald, seem separable, though I have no specimens corresponding to the figure of the latter.

My seven specimens of *ragonoti* Wals., all from Glenwood Springs, Colo. (Dr. Barnes), have the two basal spots united into a solid, somewhat dumbbell-shaped bar. This may be called var. *barnesiana*.

Eucosma optimana n. sp.

Of the size of *crambitana*. Light brown, head and patagia nearly white. Fore wing with silvery white marks as follows: A basal costal spot (absent in the male, owing to the costal fold); a long middle costal dash, obsoletely broken and at the end reaching down in an oblique bar enclosing a little spot of ground color on costa; a little spot beyond and an oblique bar just before apex, reversed in direction to the first oblique bar; median bar reaching two-thirds of wing from base, constricted centrally, roundedly lanceolate; beyond it a short, oblique bar on disk, below and opposite to the first costal bar; a long streak on submedian fold, beginning one-fourth from base, rounding up at anal angle parallel to outer margin almost to apex; a long bar above inner margin, the margin itself brown; a small basal spot below the median bar. Hind wing pale brownish, fringe lighter. Expanse 31 mm.

Type.—No. 6744, U. S. National Museum.

♂, Glenwood Springs, Colorado, October 1–7 (Dr. William Barnes); ♀, Eagle Co., Colorado (Prof. T. D. A. Cockerell).

—Dr. Dyar showed also Volume VII, Number 1, of "The Insect World," the entomological magazine published in Japanese by Y. Nawa, which contains a colored plate of a moth and larva parasitic upon Fulgoridæ. He said that this was of special interest in connection with the species found by Messrs. Schwarz and Barber in New Mexico, and which has recently been described before this Society as *Epipyrops barberiana*. Mr. Nawa's moth

is obviously an *Epipyrops*, though no specific name seems to be mentioned. Mr. Nawa might appropriately name it, as it is probably undescribed. The plate is discussed in three pages of Japanese with explanation of the figures on page 4, and there is a two-page account in English by Mr. U. Nawa at the end of the magazine. The question of the food of the *Epipyrops* larvæ seems to be still not clear. Prof. Westwood conjectured that it was the white secretion of the Fulgorids, but Mr. Nawa's account does not seem to support this view. The latter states that the larvæ secrete a white covering and that they even cause the host to be visible at a distance by this when there are several of them on one host. Dr. Dyar thought it did not seem reasonable that larvæ should secrete a substance similar to their own food. Besides, there is but very little of this pruinose matter on the Cicada-like host, certainly not enough to support several larvæ, it would seem. Mr. Heidemann had shown him specimens of the host. Might not the *Epipyrops* larvæ be true parasites after all?

—Mr. Simpson exhibited a micro-photograph of sections of the eversible gland of the larva of the Io Moth (*Automeris io* Fabricius). He stated that, in exceptional specimens, this gland was missing.

—The introduction to the following paper, presented by Mr. Busck, was then read by Dr. Dyar, in the absence of the author:

NOTES ON BRACKENRIDGE CLEMENS' TYPES OF TINEINA.*

By August Busck.

Although a few stray species of American Tineina were described before 1859, that year really marks the beginning of the study of these insects in this country. During that and the following four years the late Dr. Brackenridge Clemens, a practising physician of Easton, Pa., published a series of systematic and biological articles, which yet remain the most important contribution to our knowledge of American Tineina. These papers contain descriptions of 31 new genera and of about 200 new species, together with notes on larval habits of many of them.

* The following new names are proposed in this article: *Lithocolletis hamameliella*, new species (p. 189); *Brackenridgia*, new genus (p. 193); *Greya*, new genus (p. 194). There are also original descriptions of the following larvæ: *Stilbosis tesquella* Clemens (p. 202); *Cryptolechia obsoletella* Zeller (p. 206).

Types of all these species were deposited by Dr. Clemens in the collection of the Academy of Natural Sciences in Philadelphia. There they were studied in 1872 by Lord Walsingham, and some years later, according to information obtained through Miss Mary Murtfeldt, by Mr. V. T. Chambers, who, however, did not seem to have more appreciation of these types than he had of his own, and he only went over them in the hastiest manner. Finally they were studied in 1881 by Prof. C. H. Fernald. There is also evidence that Dr. C. V. Riley was acquainted with at least a part of them.

Prof. Fernald has kindly given me his recollections about Clemens' types in 1881. They were then just as received from Clemens, pinned with the short English brass pins on small pieces of cork glued to the glass in old-fashioned insect boxes, each cork bearing a number corresponding to a list in Clemens' handwriting.

On account of the unsafe condition of the glass boxes these types were later transferred by Mr. E. T. Cresson and Dr. Henry Skinner to a large double box, and each specimen was labeled with the number found on the cork. A statement to this effect is found in Cresson's handwriting on part of Clemens' list, yet in existence.

Since then the types of this pioneer worker in this group of insects have remained in oblivion, partly because no one took an active interest in the study of Tineina and partly because the specimens, to the uninitiated, did not give the impression of much importance, bearing no labels to indicate their true value, while the box to which they had been transferred contained a number of other moths of no importance and was stored away and subsequently overlooked and forgotten.

During a visit of the writer to the Academy in the spring of 1900, this box was not in evidence in spite of careful search and repeated inquiries. All that was found was a part of Clemens' list of his types, with Cresson's note about the disposition of them. One box, it is true, was there, which contained some specimens undoubtedly pinned by Clemens, but careful study soon revealed that only a small part of the insects were truly Clemens' own specimens, and that even those could not with any reasonable certainty be regarded as his original types. At most they only represented an insignificant proportion of his species.

Thus the collection of the types left by the founder of the study of American Tineina was given up as lost, and Clemens' description alone had to be relied upon for the identification of his species. The great majority of them have been identified with certainty from that source alone—a fact which speaks highly of the carefulness of Clemens' work. Still quite a number remained unknown to the present active workers, and some of them there was little hope of ever identifying with certainty.

Great, therefore, was the writer's delight when, on a short visit to the Academy last fall, he opened an old-fashioned double box, which had turned up in the interval between his visits, and found one side filled with what, he at once realized, was the nearly complete set of Clemens' original types.

Pinned as they were on the short English pins, many of them touched the cork with their wings and several were consequently more or less damaged; but considering their old age and their precarious method of preservation in a box which was neither dust nor insect proof, it is rather remarkable that they had not all been destroyed. However, all were in recognizable and useful condition, and some of them in a perfect state of preservation.

On this visit the writer was unable, from lack of time, to do more than merely satisfy himself of the genuineness of this collection of types; but shortly afterwards he had the opportunity, through the liberality of the U. S. Department of Agriculture, and on the invitation of the Academy in Philadelphia, to spend two weeks in the study and resurrection of this important collection, which he regards it a privilege to have been able to restore to the dignity due the founder of this branch of science in this country.

That these specimens truly are Clemens' authentic types is proven by Cresson's statement and by the list in Clemens' own hand, corresponding to the numbers on the specimens. It is further verified by several instances, where Clemens, in his description, mentions accidental peculiarities of the specimens before him, which are found to be present in the corresponding type.

The numbers on the first 124 specimens correspond, with a few easily explained exceptions, with the chronological order of Clemens' descriptions, and these were found in the same order in Clemens' handwritten list. The numbers on the rest of the types were seemingly without order and many intervals occur. On the whole, however, these also were found to correspond relatively to the chronological order, and the intervals can be accounted for by intervening types of other groups, though several unexplainable deviations occur. By careful verification of each species through the description it was not difficult for one somewhat familiar with the different forms to apply each type to its proper name, taking as starting points species already well known and working forwards or backwards according to the numbers.

The studies resulted in the identification of the types of all but eight of Clemens' 200 species. Five of these eight have been identified with certainty from Clemens' descriptions, leaving only three species unknown at present.

The types are now properly mounted on small corks pinned with stout pins in four Schmitt boxes. They can now be taken out and examined without unnecessary risk to the specimens, and each of them is correctly labeled.

The following are detailed statements of the number and conditions of these types, together with such notes on their systematic position and synonomy as are possible without monographic studies of all the families. When such studies are undertaken additional changes will probably be found necessary.

A serious drawback to the value of Clemens' descriptions was his failure to give the size of his specimen or the locality. In the following notes the writer has given alar expanse of all the species according to the measure of the type specimen, as well as the locality of all those species of which he has seen other material.

For several reasons it is found most convenient to treat the species chronologically in the order in which they are found in Stainton's edition of Clemens' North American Tineina.

Tinea biflavimaculella Clemens.

One perfect type, Clemens' No. 1; alar exp., 16.5 mm.

Stainton, who received two specimens of this species from Clemens, wrote in a foot-note in Clemens' Tineina of North America: "It appears to be almost identical with the European *Tinea rusticella*, var. *spilotella* Tengstrom," and Zeller* made it a synonym of this species. Lord Walsingham corrected this † and I have no hesitation, after comparing a good series of *biflavimaculella* with authentic European specimens of *rusticella*, in agreeing with him that Clemens' species is quite distinct. Walsingham established in the same paper the synonymy with Walker's *Tinea insignella*.‡

Biflavimaculella belongs to the genus *Monopis*, Hübner. A specimen compared with Clemens' type is in the U. S. National Mueum.

Tinea dorsistrigella Clemens.

Two perfect types, Clemens' No. 2; alar exp., 14.5 mm.

This is, as Stainton suggested (Tin. N. Am., p. 50, 1872), a good species, near, but quite distinct from, the European *ferruginella* Hübner. Walsingham has established its synonymy with *Tinea subjunctella* Walker. Clemens' types are larger than average specimens of this common species, of which a good series is found in the U. S. National Museum.

The writer has bred this species from larvæ feeding in a bird's nest. It belongs in the genus *Monopis* Hübner.

Tinea crocicapitella Clemens.

One perfect type, Clemens' No. 3; alar exp., 14 mm.

Lord Walsingham made this species a synonym of the European *ferruginella* Hübner, and it has been retained as such in Riley's

* Verh. k. k. zool.-bot. Gesell. Wien., xxiii, p. 220, 1873.

† Trans. Am. Ent. Soc., x, p. 170, 1882.

‡ Cat. Lep. Het. Brit. Mus., xxviii, p. 471, 1863.

list and subsequently. This is an error; *ferruginella* is intermediate between the two American species, *dorsistrigella* Clemens and the present species, and it is quite as near the former as the latter. *Crocicapitella* is very distinct and shows no variation towards the European form, differing in the lighter and duller, more brownish ground color, in the darker head and thorax, and especially in the absence of white scaling on the costal edge above the transparent discal spot. It also lacks the small, sharp, light costal streaks found towards the apex in *ferruginella*.

Tinea carnariella Clemens.

One type, the wings on left side absent; otherwise in good condition. Clemens' No. 4; alar exp., 18 mm.

From the description of this species, or probably more from the habits of the larva, Stainton surmised that it might be the cosmopolitan *Tinea pellionella* Linn.* But several discrepancies in the description intimated that he was wrong in this assumption, and Clemens' type now proves that it is quite a different species. It is a true *Tinea*. No other specimen exactly like the type is at present known to the writer.

The condition of this specimen—lacking the wings on one side—is characteristic of many of Clemens' types and is explained by the note in his letter of June 23, 1860, to Stainton, published by the latter in his edition of Clemens' papers (p. 36): "I cannot promise, however, to send specimens of all the Tineina I have described, for frequently the descriptions have been drawn from a single specimen, which has been deprived of one pair of wings" [evidently for the purpose of structural studies].

Tinea lanariella Clemens.

One type in good condition, Clemens' No. 5; alar exp., 14 mm. As determined by Stainton, who received four specimens of this species from Clemens, it is the same as the cosmopolitan *Tineola biselliella* Hümmel, and must be known under that name. Compared specimens are in the U. S. National Museum.

Tinea nubilipennella Clemens.

One type, somewhat rubbed but easily recognizable, Clemens' No. 6; alar exp., 15 mm.

As determined by Stainton, this species is identical with the European *Tinea fuscipunctella* Haworth. I have examined the types of *Œcophora frigidella* Packard, from Labrador, now in the Museum of Comparative Zoology in Cambridge, Mass., and concur with Lord Walsingham's opinion that they represent

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* Tin. N. Am., p. 51, 1872.

the same species.* A large series compared with Clemens' type is in the U. S. National Museum.

The writer has bred this species repeatedly from the nests of tame pigeons at Washington, D. C.

Tinea variatella Clemens.

One type in poor condition, with head and left fore wing missing. Clemens' No. 7; alar exp., 12.5 mm.

Probably the same as the European *Tinea granella* Linn., as suggested by Stainton.

Xylesthia pruniramiella Clemens.

Two types, with head missing in both; otherwise in good condition. Clemens' No. 8; alar exp., 12 and 14.5 mm. I have examined Chambers' type of *Xylesthia clemensella*† in the Museum of Comparative Zoology in Cambridge, and Zeller's specimen of *Xylesthia congeminatella*,‡ and I am convinced that these species are identical and the same as Clemens' species. I have collected a large series around Washington, and in Kentucky and Missouri. The differences which Zeller and Chambers found in comparison with Clemens' description are simply due to the different state of preservation of their specimens. The delicately loose-scaled fore wings of this species are exceedingly easily injured by handling and then present quite a changed appearance.

Compared specimens are in U. S. National Museum.

Amydria effrenatella Clemens.

One type, the abdomen missing, otherwise perfect. Clemens' No. 9; alar exp., 27 mm.

This type agrees with our preconceived conception of the species derived from Clemens' description. Compared specimens are in U. S. National Museum from the Atlantic Coast region. Stainton, who had a specimen of this species from Clemens, suggested that the genus was the same as *Euplocamus*, Latreille; but, as pointed out by Clemens himself, it differs in possessing well developed maxillary palpi.

Anaphora plumifrontella Clemens.

One somewhat rubbed type, Clemens' No. 10; alar exp., 33 mm.

This type verifies the present conception of the species, as defined by Walsingham, with *bombycina* Zeller as synonym. It belongs to the genus *Acrolophus* Poey. A large series, collected

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* Trans. Am. Ent. Soc., x, p. 171, 1882.

† Can. Ent., v, p. 174, 1873.

‡ Verh. k. k., zool.-bot. Gesell. Wien., xxiii, p. 218, 1873.

at light by the writer at Washington, D. C., and compared with Clemens' type, is in the U. S. National Museum.

Anaphora popeanella Clemens.

Two types, both rubbed, one unspread and without abdomen; the other spread, and lacking the head and left wings. Clemens' No. 11; alar exp., 28 mm.

Like the present conception of *Anaphora popeanella*, as determined by Walsingham and synonymous with *scardina* Zeller, and with *agrotipennella* Grote. A specimen compared with the type is in the U. S. National Museum.

Habitat: Eastern United States.

Anaphora arcanella Clemens.

One type, without abdomen but otherwise in good condition, Clemens' No. 12; alar exp., 29 mm.

This species was transferred to the new genus *Pseudoanaphora* by Lord Walsingham. A specimen compared with the type is in the U. S. National Museum.

Habitat: Eastern United States.

Lithocolletis lucidicostella Clemens.

Two types, one perfect, the other without abdomen and hind wings. Clemens' No. 13, alar exp.. 7.5 mm.

Specimens bred from the underside of leaf of sugar maple and agreeing with the type are in the U. S. National Museum.

In Riley's List this species is by mistake printed *ludicostella.*

Lithocolletis robiniella Clemens.

One type, right fore wing missing, Clemens' No. 14; alar exp., 6 mm.

This type is not in very good condition, but is easily recognized as the well known *Robinia* feeder, common in the eastern States, and synonymous with the earlier described *Argyromiges psuedoacaciella* Fitch, but supplanting this preoccupied name.

The similar species which Clemens bred from *Amphicarpæa monoica* and which he believed to be *robiniella* is *Lithocolletis morrisella* Fitch.

Lithocolletis desmodiella Clemens.

Three types, Clemens' No. 15; alar exp., 4.5 mm.

These types represent our common smallest species of *Lithocolletis*, which is the same as that subsequently described by Miss Murtfeldt as *gregariella*, as shown by Lord Walsingham.

Habitat: Eastern United States.

Lithocolletis æriferella Clemens.

One perfect type, Clemens' No. 16; alar exp., 7.5 mm.

Specimens bred from the underside of oak leaves and compared with Clemens' type are in the U. S. National Museum.

Habitat: Eastern United States.

Lithocolletis basistrigella Clemens.

One type in good condition, Clemens' No. 17; alar exp., 8 mm.

Bred specimens of this well marked species, compared with the type, are in the U. S. National Museum. The larva makes a mine on the underside of oak leaves. The species is synonymous with the later described *Lithocolletis intermedia* Frey and Boll.

Lithocolletis argentifimbriella Clemens.

One perfect type, Clemens' No. 18; alar exp., 7.5 mm.

Bred specimens, compared with the type of this well known species, are in U. S. National Museum. Lord Walsingham has shown the synonymy with Chambers' *Lithocolletis fuscocostella*.

Lithocolletis obscuricostella Clemens.

One type, with right fore wing missing, otherwise in good condition. Clemens' No. 19; alar exp., 6 mm.

Clemens rightly gave weight (by italicising) to the peculiar coloration of the abdomen; but his description, "Black, tipped freely with yellow," is unfortunate. He meant that the base of the abdomen is black and the larger posterior portion is yellow. The underside is silvery. I have seen no specimen exactly like this type, but the species should be easily rediscovered through knowledge of the food-plant *Ostrya virginica*.

Chambers has himself* established the synonymy with his *Lithocolletis virginiella*.

Lithocolletis ostryæfoliella Clemens.

One type, with left fore wing missing and the other fore wing somewhat crippled, is still recognizable and agrees with the description. Clemens' No. 20; alar exp., 6 mm. I have no specimen exactly like this type. The species is exceedingly near to the foregoing species, which was bred from the same food-plant, but the minute differences in the wing markings and the color of the abdomen, pointed out by Clemens, are well substantiated by the types.

Chambers suggested and Walsingham confirmed the synonymy with *Lithocolletis mirifica* Frey and Boll.

Lithocolletis lucetiella Clemens.

One perfect type, Clemens' No. 21; alar exp., 7 mm.

Bred specimens of this very distinct species, compared with the type, are in the U. S. National Museum. Lord Walsingham has established the synonymy with *Lithocolletis ænigmatella* Frey and Boll.

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* Can. Ent., xi, p. 92, 1879.

Lithocolletis obstrictella Clemens.

One type, right fore wing and abdomen missing. Clemens' No. 22; alar exp., 7.5 mm.

I have no specimen like this type, which was bred, according to Clemens, from the underside of leaves of oak. The knowledge of the mine ought to insure its rediscovery.

Lithocolletis caryæfoliella Clemens.

Two types, one perfect, the other consisting only of head and left fore wing. Clemens' No. 23; alar exp., 6.5 mm.

Bred specimens compared with the type are in the U. S. National Museum. The generally accepted synonymy, suggested by Clemens himself, with *Lithocolletis juglandiella* Clemens, is probably correct. This latter species was named from the larva and mine only.

Lithocolletis aceriella Clemens.

One type, almost totally destroyed, only the head left on the pin, Clemens' No. 24.

In the U. S. National Museum are specimens bred from upper surface mines on maple which agree with Clemens' description and with what is left of his type. They undoubtedly represent this species. Alar exp., 6.5 mm.

Clemens states that the larva is found also in the leaf of *Hamamelis virginica*, but I am inclined to believe that he was mistaken and that the exceedingly similar but slightly larger species, which I have repeatedly bred from witch hazel, is a distinct species. It differs from *aceriella* in the more reddish tuft, in the somewhat darker ground color and in the dorsal silvery streak above the cilia, which is more oblique, nearly parallel with the edge, while in *aceriella* it is more erect. Further, the two silvery fasciæ are, in the *Hamamelis* feeder, absolutely parallel, while they are slightly diverging in *aceriella*. The *Hamamelis* feeder may be known as *Lithocolletis hamameliella*.

Alar exp., 7 mm.

Type.—No. 6772, U. S. National Museum.

Lithocolletis guttifinitella Clemens.

One type, right fore wing missing, otherwise in perfect condition, Clemens' No. 25; alar exp., 7 mm.

Clemens describes the antennæ as blackish brown, omitting the silvery annulations, which are shown on type. Otherwise, it is a good description of the type, which represents the one extreme variety of our common "poison ivy" *Lithocolletis*, which has the two transverse fasciæ nearly straight and diverging, the outer one being nearly perpendicular on the edge of the wing, while the inner one is oblique, nearer base on the dorsal side.

The other extreme of this variable species is described by Frey and Boll as *Lithocolletis toxicodendi.** This has the two fasciæ

* Stett. ent. Zeit., xxxix, p. 273, 1878.

parallel, both being oblique, with dorsal ends nearer the base of the wing than the costal. These fasciæ are besides in this variety slightly angulated outwardly at their upper third, especially the one nearest the base of the wing. I have bred unlimited numbers of this species from poison ivy around Washington, D. C., and have every intermediate form between the two extremes, and there is no doubt that the two names stand for the same species. Clemens' name will hold.

Chambers made his *Lithocolletis æsculisella** a synonym of *guttifinitella*, but Lord Walsingham doubted this, considering it exceedingly improbable. The name should be retained as a separate species.

Lithocolletis cratægella Clemens.

One type, unspread, but perfect, Clemens' No. 26, ; alar exp., 6.5 mm.

This type proves Lord Walsingham's assertion† that Clemens' species is the same as the common European apple-feeder, *Lithocolletis pomifoliella* Zeller, now known under the name *Lithocolletis blancardella* Fabricius. Lord Walsingham placed *Lithocolletis deceptusella* Chambers as a synonym of this species.‡

Lithocolletis hamadryadella Clemens.

One perfect type, Clemens' No. 27; alar exp., 6.5 mm. A pin with the number 27–F has evidently borne his variation F, but the specimen is destroyed.

This type represents our well known, most common *Lithocolletis* on oak, described later by Zeller as *alternatella*.§ A bred series compared with Clemens' type is in the U. S. National Museum.

Lithocolletis argentinotella Clemens.

Two types, the one perfect, the other without fore wings, Clemens' No. 28; alar exp., 6.5 mm.

Specimens bred from underside mines on elm and compared with Clemens' type are in the U. S. National Museum.

Tisheria solidagonifoliella Clemens.

The type of this species with Clemens' No. 29 is lost. The species, however, is well known from Clemens' description and the knowledge of its food plant.

Bred specimens, agreeing with description and undoubtedly representing the species, are in the U. S. National Museum. Alar exp., 7 mm.

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* Printed *æsculella* in Riley's List by mistake.

† Trans. Am. Ent. Soc., x, p. 202, 1882.

‡ Ins. Life, iii, p. 328, 1891.

§ Wrongly quoted by Chambers, in his Index, as *alternata*.

Tisheria zelleriella Clemens.

One type, consisting only of the right fore wing, gummed on Clemens' label No. 30.

Lord Walsingham* proved the synonymy of this species with *complanoides* Frey and Boll, and with *latipennella* Chambers. He erected the new genus *Coptotriche* for this remarkable form.† There is a bred series in the U. S. National Museum. Alar. exp., 10 mm.

The species is common around Washington, D. C.

Tisheria citrinipennella Clemens.

One type, right hind wing and abdomen missing, otherwise in good condition; Clemens' No. 31; alar exp., 8 mm.

Lord Walsingham‡ has declared this species the same as the other oak-feeding *Tisheria* subsequently described by Clemens (*quercitella*). I am unable to concur in this view. While the present species may be the same as *Tisheria quercivorella* Chambers, as determined by Walsingham, Clemens' *Tisheria quercitella* is undoubtedly *tinctoriella* Chambers, and will have to supplant that name. It is the only oak-feeding *Tisheria* which makes the circular silk-lined nidus for pupation, as described by Clemens and Chambers. The color of this nidus varies according to the species of oak, and is on white oak, as Clemens describes it, whiter than the rest of the mine, and it is not always dark-veined as described by Chambers, and as is usually the rule.

Clemens' types of the two species, though both are in poor condition, substantiate fully this view.§ Series of both species from Washington, D. C., and from West Virginia, bred by the author, are in U. S. National Museum.

Phyllocnistis vitigenella Clemens.

Two perfect types, Clemens' No. 32; alar exp., 5 mm.

Bred specimens, agreeing with the types of this well known species, are in the U. S. National Museum.

Leucanthiza amphicarpeæfoliella Clemens.

One type, left wings missing, otherwise in good condition; Clemens' No. 33; alar exp., 6.5 mm.

I have bred this beautiful and well described species from upper surface mines of hog peanut at Washington, D. C. Bred specimens compared with Clemens' type are in the U. S. National Museum.

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* Ins. Life, iii, p. 387, 1891.
† Ins. Life, ii, p. 322, 1890.
‡ Ins. Life, iii, p. 387, 1891.
§ See *post*, under *Tisheria quercitella*.

Coleophora coruscipennella Clemens.

One perfect type, Clemens' No. 34, alar exp., 12 mm.

Zeller made this common American species a synonym of the European *Coleophora fabriciella* Villers, which is now known under the name *spissicornis* Haworth, and it certainly would be exceedingly diffcult to distinguish between them. Still, as long as the life history and early stages of the American species is unknown, there is a possibility that it may be distinct, and I should have favored retaining it as such. A large series, collected at light around Washington, D. C., and compared with Clemens' type, is in the U. S. National Museum.

Coleophora laticornella Clemens.

One good type, Clemens' No. 35; alar exp., 11 mm.

This proves to be the elm-feeding *Coleophora*, which has been of some economic importance of late years through its occurrence in large numbers in the parks of Brooklyn, N. Y. I have bred a large series of this species and am unable to distinguish it from authentic specimens (adults and cases) of the European *Coleophora limosipennella* Duponchel, which feeds on elm in Europe.

Our present knowledge of the genus *Coleophora* in this country is in such a hopeless state that I cannot indicate other synonyms of this species, though they doubtless exist among the 67 described species. Our names have been given mostly without knowledge of the food plants and without any comparisons with previously described species. The present species will probably be found among them under another name. This, however, will not interfere with the much older European name.

A bred series, compared with Clemens' type, is in the U. S. National Museum.

Coleophora cænosipennella Clemens.

The type of this species, Clemens' No. 36, is lost. I have not yet been able to identify the species from the description with certainty.

Coleophora infuscatella Clemens.

One type, lacking left wings, otherwise in good condition, Clemens' No. 37; alar exp., 11 mm.

I have no specimen exactly like this.

Coleophora cretaticostella Clemens.

One type, abdomen and right wings missing, Clemens' No. 38; alar exp., 12.5 mm.

I have no specimen like this.

Incurvaria russatella Clemens.

The type of this species, Clemens' No. 39, cannot now be found.

Lord Walsingham examined this type in 1872, and from his recollection and notes on it, concluded that his *Lampronia tripunctella* was a synonym. He has also made *Eudarcia simulatricella* Clemens synonymous with *Tinea cœmitariella* Chambers. I have examined types of both these latter species and they are undoubtedly congeneric, but just as surely specifically distinct. The former is evidently Walsingham's *Lampronia tripunctella* , agreeing in all particulars with his description and figure. The latter agrees well with Clemens' decription of *russatella*, but could not be Walsingham's species, lacking as it does the white apical cilia found in *tripunctella* and also in Clemens' type of *simulatricella*, though not mentioned by Clemens. *T. russatella* should then be known as *Eudarcia russatella* Clemens.

A specimen collected by the writer in Kentucky, and Chambers' type of *cœmitariella* [No. 412] are in the U. S. National Museum.

Incurvaria (Ornix) acerifoliella Fitch.

The specimen of this species received by Clemens from Fitch is found under Clemens' No. 40. The right wings are missing; alar exp., 11.5 mm.

This agrees with our present conception of the species, specimens of which are in the U. S. National Museum. Lord Walsingham has shown the synonymy of *Tinea iridella* Chambers with this species. The species falls, according to the venation, intermediate between the genera *Incurvaria* and *Eudarcia*, though it cannot rightfully be placed in either genus, as already shown by Clemens.

I propose the name *Brackenridgia*, for the genus of which *acerifoliella* is type and which has the following very distinct venation:

Fore wings 11 veins, vein 4 absent, all separate, 7 to costa, 1*b* furcate at base. Hind wings as broad as fore wings, 8 veins, veins 5 and 6 stalked, rest separate, vein 6 to apex. The oral characters are as in *Incurvaria*.

No other species is at present known to the writer.

It is in this connection well to draw attention to the fact that probably only two out of the ten American species hitherto placed in *Incurvaria* truly belong in this genus, namely *Incurvaria œnescens* Walsingham and *Incurvaria politella* Walsingham. Besides these, *labradoriella* Clemens* may profitably be left in the genus for the present until more material is obtained, though the appearance of the incomplete type, Clemens' No. 215,* does not suggest that genus as Clemens also noted.

The same is the case with *mediostriatella* Clemens,* which

*See *post*, under this species.

only differs from the genus in having veins 7 and 8 in the fore wings stalked. It is also true of *oregonella* Walsingham, of which only the single type in Lord Walsingham's possession is known, but which will probably be found not to belong to *Incurvaria* when additional material is at hand.

Of the other species hitherto placed in *Incurvaria*, two have now been disposed of, namely, *Eudarcia russatella* and *Brackenridgia acerifoliella*. The remaining three species form a separate genus, which may appropriately be known as *Greya* in honor of Lord T. de Grey Walsingham, who has added so materially to our knowledge of American Tineina, and who has described all the three species included in the genus, namely, *humilis*,* *punctiferella*, and *solenobiella*.† *Greya* is at once distinguished from the nearly related *Incurvaria* by the absence of vein 10 in the fore wings.

It has the following venation:

Fore wings 11 veins, vein 10 absent, all separate; hind wings as broad as fore wings, 8 veins, all separate. Other characters as in *Incurvaria*.

Authentic representatives of all of the foregoing species except *labradoriella* are in the U. S. National Museum.

Plutella vigilaciella Clemens.

One type in good condition, Clemens' No. 41; alar exp., 14.5 mm.

This is, as determined by Stainton, a synonym of the European *Plutella porrectella* Linnæus. Specimens compared with Clemens' type are in the U. S. National Museum.

Plutella limbipennella Clemens.

One type, Clemens' No. 42; alar exp., 13.5 mm.

This is, as determined by Stainton, a synonym of the cosmopolitan *Plutella cruciferarum* Zeller, now known as *Plutella maculipennis* Curtis.

Plutella mollipedella Clemens.

One type, Clemens' No. 43; alar exp., 14 mm.

This is, as shown by Stainton, the female of the foregoing species.

Gracilaria superbifrontella Clemens.

One type in fine condition, but lacking the left wings, Clemens' No. 44; alar exp., 14 mm.

In spite of Clemens' definite statement that his species feeds on witch hazel (*Hamamelis virginica*), Lord Walsingham has made it synonymous with the European oak-feeding *Gracilaria*

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* Ins. Life i, pp. 145, 146, 1888.

† Proc. Zool. Soc. Lond., p. 82, 1880.

alchimiella Scopoli. He also makes it synonymous with the American maple-feeding *Gracilaria packardella* Chambers, and with the American oak-feeding species of Frey.

This is not the case; *superbifrontella* Clemens must be retained as a good species attached to *Hamamelis*. So must *packardella* Chambers (= *elegantella* Frey, Stett. ent. Zeit., xxxiv, p. 202, 1873), attached to *Acer*, while the American oak-feeding species, determined by Frey as *superbifrontella*, may or may not be the same as the European *alchimiella* Scopoli. I have not sufficient bred material to settle this last point with certainty. All of these species are very close and somewhat variable. Bred specimens, compared with Clemens' type, are in the U. S. National Museum.

Gracilaria fulgidella Clemens.

One type, lacking the right fore wing, Clemens' No. 45; alar exp., 7.5 mm.

This is different from any other described American *Gracilaria*, and I have no specimen like it. Clemens' description is very accurate, though it would seem more natural to regard the dark color as the ground color, marked with white, dark-margined fasciæ. The species is nearest to *Gracilaria astericola* Frey and Boll.

Gracilaria venustella Clemens.

One type, lacking abdomen and left wing, Clemens' No. 46; alar exp, 6.5 mm.

There is another of Clemens' specimens, labeled 197, the same as this type, and also lacking the left wings. This is evidently the specimen from which Clemens redescribed the species.*

This is, as determined by Chambers himself,† the same as *Gracilaria eupatoriella* Chambers. Specimens collected at light in Kentucky and at Washington, D. C., by the writer, and compared both with Chambers' type in the Cambridge Museum of Comparative Zoology and with Clemens' type, are in the U. S. National Museum. The species belongs in Walsingham's genus *Dialectica*,‡ but may remain in *Gracilaria* Haworth until the group is worked up.

Gracilaria strigifinitella Clemens.

One type, left fore wing missing. Clemens' No. 47; alar exp., 8.5 mm.

This is the same species described by Chambers as *Gracilaria duodecemliniella* and also the same as his *Ornix quercifoliella*.

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*Tin. N. A., p. 216, 1872.
† Bull. U. S. Geol. Surv. Terr., iv, 150, 1878.
‡ Proc. Zool. Soc. Lond., p. 150, 1897.

The types of both these species are in the Cambridge Museum of Comparative Zoology, and agree with the present type, as the descriptions would indicate. In Professor C. H. Fernald's collection are two specimens of this species bearing Lord Walsingham's blue labels 722 and 723, and determined in his note-book as *Ornix quercifoliella* Cham. = *Gracilaria duodecemliniella* Chambers (?) and with the note: "The description is not satisfactory; it needs redescription, and evidently belongs in the genus *Gracilaria.* Closely allied to *Coriscium brogniardellum* Fabricius in color and markings, but having the palpi of a *Gracilaria*" (Walsingham).

One perfect specimen, bred by the writer from oak at Washington, D. C., and compared with all three types of this species, is in the U. S. National Museum, besides several collected specimens.

The species belongs in the genus *Dialectica* Walsingham, which is separated from *Gracilaria* Haworth mainly by the pectinated posterior tibiæ; it may, however, like the foregoing species, remain in *Gracilaria* for the present.

Gracilaria violacella Clemens.

One type, Clemens' No. 48; alar exp., 9 mm.

There is another specimen of this species, namely, the bred specimen described later by Clemens as *desmodifoliella*. This specimen has Clemens' No. 412. These specimens represent our well known *Desmodium* feeder. Bred specimens compared with the type are in the U. S. National Museum.

The name *violacella* must be retained for this species.

Argyresthia oreasella Clemens.

Two types, one without the left wings, the other consisting only of the left wings; both are now pinned together on the same cork; Clemens' No. 49; alar exp., 10 mm.

This is, as determined by Stainton, the same as the European *Argyresthia andereggiella* Duponchel. Specimens compared with Clemens' types are in the U. S. National Museum.

Ornix trepidella Clemens.

The type of this species, Clemens' No. 50, is lost.

Ornix festinella Clemens.

One type, badly rubbed, Clemens' No. 51; alar exp., 7.5 mm. I am at present unable to give any opinion on the distinctions between this species and the others described by Clemens, owing to the condition of the types and the lack of bred material.

Ornix cratægifoliella Clemens.

One type, Clemens' No. 222 (52); alar exp., 8 mm.

Specimens bred from black thorn by the writer at Washington,

D. C., and agreeing with Clemens' type, are in the U. S. National Museum.

Hyponemeuta multipunctella Clemens.

One type, lacking the right hind wing and part of the abdomen, Clemens' No. 53; alar exp., 21 mm.

This is a male of the well known species as determined by Dr. H. G. Dyar.*

Bedellia staintoniella Clemens.

One type, Clemens' No. 54; alar exp., 10 mm.

This is, as determined by Stainton, and subsequently by Clemens himself, the cosmopolitan *Bedellia somnulentella* Zeller.

Cosmiotes illectella Clemens.

The type of this species, Clemens' No. 55, is lost.

I have not recognized the species, which Riley by mistake called *illicitella*.†

The genus *Cosmiotes* was afterwards recognized by Clemens as synonymous with *Elachista* Treitsche.

Cosmiotes maculoscella Clemens.

One type without left wings, Clemens' No. 56; alar exp., 7 mm.

I have no specimen like this type, which is somewhat rubbed, although easily recognized from Clemens' description.

Cosmiotes madarella Clemens.

One type without the right wings, Clemens' No. 57; alar exp., 8 mm.

I have seen no other specimen of this species which suggests in coloration the American species of the genus *Antispila* Hübner.

Cosmopteryx gemmiferella Clemens.

One type, left wing missing, Clemens' No. 58; alar exp., 11.5 mm.

As shown by Stainton, Clemens had two species mixed, the present and the one subsequently described by Stainton as *clemensella*. The type in Philadelphia represents Clemens' own species. Specimens compared with the type are in the U. S. National Museum.

Eudarcia simulatricella Clemens.

One type in perfect condition. Clemens' No. 59; alar exp., 8 mm.

This species has been treated already (see ante, page 193) and

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* Can. Ent. xxxii, p. 38, 1900.

† Smith's List Lep. Bor. Am., No. 5797, 1891.

the synonymy of *Lampronia tripunctella* Walsingham shown. *Tinea cœmitariella* Chambers, hitherto placed as a synonym of this species, is found to be distinct and the same as *Eudarcia russatella* Clemens. A specimen compared with Clemens' type is in the U. S. National Museum.

Antispila nyssæfoliella Clemens.

One perfect type. Clemens' No. 60; alar exp., 7.5 mm.

A bred series, compared with the type of this well known species, is in the U. S. National Museum.

Antispila cornifoliella Clemens.

One type, Clemens' No. 61; alar exp., 7.5 mm.

Bred specimens compared with Clemens' type are in the U. S. National Museum.

Aspidisca splendoriferella Clemens.

Two types, Clemens' No. 63;* alar exp., 4.5 mm.

This is the well known species afterwards described by Packard as *Lyonetia saccatella*. *Aspidisca pruniella* Clemens, named from the larva only, is the same species.

Lord Walsingham has substituted the generic name *Coptodisca* for the preoccupied *Aspidisca*.

Diachorisia velatella Clemens.

One type, in poor but recognizable condition, Clemens' No. 64; alar exp., 9.5 mm.

I have no specimen exactly like this type.

Bucculatrix coronatella Clemens.

The type of this species, Clemens' No. 65, is lost.

In the U. S. National Museum is a large series bred from black birch and determined as this species. As it agrees with Clemens' description and very likely was compared with Clemens' type, this series may properly be regarded as representing *B. coronatella*.

Anorthosia punctipennella Clemens.

One perfect type, Clemens' No. 66; alar exp., 12 mm.

This is like our present conception of the species as defined by the writer.† Specimens compared with the type are in the U. S. National Museum.

Gelechia cerealella Olivier.

One specimen of this cosmopolitan species, *Sitotroga cerealella* Olivier, is found under Clemens' No. 67.

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*No type is found under No. 62, and no name for that number in Clemens' list.

† Proc. U. S. Nat. Mus., xxv, p. 918, 1902.

Gelechia agrimoniella Clemens.

One type, Clemens' No. 68; alar exp., 13 mm.

This is like the present conception of the species* and belongs in the genus *Anacampsis* Curtis. Specimens compared with the type are in the U. S. National Museum.

Gelechia flavocostella Clemens.

One type, palpi and left wings missing. Clemens' No. 69; alar exp., 19 mm.

As determined by Clemens subsequently, this species belongs to his genus *Trichotaphe*, and the type confirms the present conception of the species.† Specimens compared with the type are in the U. S. National Museum.

Gelechia roseosuffusella Clemens.

Two types in good condition, Clemens' No. 70; alar exp., 10.5 mm.

In spite of the additional evidence of these types, there is still, as I have shown,‡ some uncertainty about the identity of this species. The food plant, according to Clemens, is sumach. The species belongs to the genus *Aristotelia* Hübner.

Gelechia rhoifructella Clemens.

One type, lacking the right wings, Clemens' No. 71; alar exp., 18 mm. This agrees with my conception of the species; it belongs in the genus *Anacampsis* Curtis.

For references and synonymy of the Gelechiid species, see my Revision of American Gelechiidæ.§

Gelechia rubidella Clemens.

One type, ♀, right wings missing, Clemens' No. 72; alar exp., 11 mm.

This type confirms the present conception of the species, and it belongs in the genus *Aristotelia* Hübner. Compared specimens are in the U. S. National Museum.

Gelechia flexurella Clemens.

Of this species, Clemens' Nos. 94 and 95 according to his list, there is unfortunately no type. The species is at present unrecognized and of uncertain generic position.

Gelechia mimella Clemens.

Clemens' No. 96. Exactly the same conditions exist as with the foregoing species.

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*Busck, Proc. U. S. Nat. Mus., xxv, p. 850, 1902.
†Busck, Proc. U. S. Nat. Mus., xxv, p. 908, 1902.
‡Proc. U. S. Nat. Mus., xxv, p. 796, 1902.
§Proc. U. S. Nat. Mus., xxv, p. 845, *et seq.*, 1902.

Gelechia detersella Clemens.

One type, the wings on the left side missing, otherwise in good condition. Clemens' No. 75; alar exp., 11.5 mm.

This species was renamed by the writer *brackenridgiella* on account of pre-occupation of Clemens' specific name, as shown by Stainton thirty years ago. It is now found to belong to the genus *Gnorimoschema* Busck.

I have seen no other specimen of this species.

Strobisia irridipennella Clemens.

Two types, Clemens' No. 73; alar exp., 11.5 mm.

These types agree with the present conception of this beautiful species. For full synonymy and references see my Gelechiid paper.* Specimens compared with Clemens' type are in the U. S. National Museum.

Strobisia emblemella Clemens.

One type, wings on the right side missing. Clemens' No. 74; alar exp., 9 mm.

This also confirms our present conception. Specimens compared with the type are in the U. S. National Museum.

Endrosis kennicottella Clemens.

One type, Clemens' No. 76; alar exp., 20 mm.

This type proves, as Stainton suggested, the identity with the European *Endrosis fenestrella*, now known as *lacteella* Denis and Schiffermüller. Specimens compared with Clemens' type are in the U. S. National Museum.

Evagora apicitripunctella Clemens.

One type, without wings on the right side. Clemens' No. 77; alar exp., 9 mm.

This type proves my contention as against Lord Walsingham's determination of the species.† The species should be known as *Recurvaria apicitripunctella*. Specimens compared with the type are in the U. S. National Museum.

Trichotaphe setosella Clemens.

One type, right wings missing, Clemens' No. 78; alar exp., 17 mm.

This type confirms my view as diverging from that of Lord Walsingham concerning this species. It is a *Trichotaphe* and not an *Ypsolophus*. Compared specimens are in the U. S. National Museum.

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* Proc. U. S. Nat. Mus., xxv, p 904, 1902.

† See my Revision of American Gelechiidæ, Proc. U. S. Nat. Mus., xxv, p. 808, 1902.

Trichotaphe juncidella Clemens.

One type, without wings on left side, Clemens' No. 79; alar exp., 14 mm.

This type also agrees with my conception of the species. Bred specimens, compared with Clemens' type, are in the U. S. National Museum.

Callima argenticinctella Clemens.

Two types, one perfect, the other without wings on the left side, Clemens' No. 80; alar exp., 14 mm.

This is like our present conception of this common species. Specimens compared with the types are in the U. S. National Museum. Dr. H. G. Dyar has changed* the generic name on account of the older *Kallima* Westwood and the genus is now known as *Epicallima* Dyar.

Nomia lingulacella Clemens.

One type, right fore wings missing, Clemens' No. 81; alar exp., 8 mm.

Clemens changed his preoccupied generic name to *Chrysopora*, under which name the species is now known. Compared specimens are in the U. S. National Museum.

Trypanisma prudens Clemens.

One type, left wings missing, Clemens' No. 82; alar exp., 8.5 mm.

As shown by the writer† Chambers' *Gelechia quinqueannulella* is synonymous with this species. Bred specimens, compared with Clemens type, are in the U. S. National Museum.

Butalis fuscicomella Clemens.

One perfect type, Clemens' No. 83; alar exp., 13 mm.

This type proves the species to be the same as *Butalis eboracensis* Zeller‡ and Clemens' name must fall for this earlier name. The "yellowish tint" mentioned by Clemens and objected to by Zeller for this species§ is a barely perceptible tinge found in all the unicolorous specimens. Specimens determined by Lord Walsingham as Zeller's species and agreeing with his description are in the U. S. National Museum, compared with Clemens' type. The species should be known as *Scythris eboracensis* Zeller.

Butalis flavifrontella Clemens.

One perfect type, Clemens' No. 84; alar exp., 14 mm.

This type confirms Lord Walshingham's contention,‖ previ-

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* Bull. 52, U. S. Nat. Mus., p. 525, 1902.

† Proc. U. S. Nat. Mus., xxv, p. 815, 1902.

‡ Linn. Ent., x, p. 205, 1855.

§ Verh. k. k, zool.-bot. Gesell. Wien, xxiii, p. 292, 1873.

‖ Ins. Life, i, p. 114, 1888.

ously suggested by Stainton*, that this species is synonymous with Zeller's *Butalis basilaris*. The species should be known as *Scythris basilaris* Zeller. Specimens, compared with type, are in the U. S. National Museum.

Butalis matutella Clemens.

One perfect type, Clemens' No. 85; alar exp., 12 mm.

This type likewise proves the synonymy, generally accepted, with *impositella* Zeller. The species must be known as *Scythris impositella* Zeller. Compared specimens are in the U. S. National Museum.

Anarsia pruniella Clemens.

Two perfect types, ♂ and ♀, Clemens' Nos. 86 and 87; alar exp., 14 mm.

This is, as already realized by Clemens, the European *Anarsia lineatella* Zeller.

Stilbosis tesquella Clemens.

Two types in perfect condition, Clemens' No. 88; alar exp., 9 mm.

I have long been acquainted with this fine species, which I have determined correctly from Clemens' description. The larva feeds on hog peanut (*Amphicarpæa monoica*), near Washington, D. C., spinning the leaflets together. It is a prettily marked and very striking larva:

Head light yellow; eye spots black; body yellowish white, with thoracic shield, anal plate, thoracic feet, and all tubercles, blackish brown. Length of full-grown larva, 8.5 mm.; width of head 0.6 mm.

It may be found in July; the moth issues in the beginning of August. Bred series, compared with Clemens' type, and blown larvæ, are in the U. S. National Museum.

Laverna luciferella Clemens.

One type, left wings missing, otherwise in good condition, Clemens' No. 89; alar exp., 10 mm.

In the U. S. National Museum are two specimens collected by Mr. N. Banks, at Sea Cliff, N. Y., which are identical with the type of this striking species. Lord Walsingham† has made *Laverna cephalanthiella* Chambers‡ a synonym of this species, but this is not correct. I fail to see how a careful perusal of the two descriptions could allow the conclusion. In the U. S. National Museum is a large bred series of Chambers' species

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* Tin. N A., p. 126, 1872.
† Trans. Am Ent. Soc, x, p. 196, 1882.
‡ Can. Ent., iii, p. 221, 1872.

compared with his type in Cambridge, Mass., and it is a very different form from *luciferella*, which is well described by Clemens. Both species must stand, and both may probably be included in the genus *Mompha*.

Laverna eloisella Clemens.

One type, without wings on the right side, Clemens' No. 90; alar exp., 14 mm.

This is our well known *Œnothera* stem borer. Specimens compared with the type are in the U. S. National Museum. Lord Walsingham* has rightfully pointed out the synonymy of this species with *Laverna œnotherella* Chambers, and *Phyllocnistis magnatella* Zeller.

Chrysocoris erythriella Clemens.

Three types, two perfect, one with left wings only, Clemens' No. 91; alar exp., 9.5–10.5 mm.

Specimens bred by the writer and compared with Clemens' types are in the U. S. National Museum. *Chrysocoris* is synonymous with the European *Schreckensteinia* Hübner, under which generic name the species is now known.

Elachista præmaturella Clemens.

Two types, Clemens' No. 92; alar exp., 7.5 mm.

A specimen compared with Clemens' type is in the U. S. National Museum.

Brenthia pavonacella Clemens.

One type in good condition, Clemens' No. 93; alar exp., 11 mm.

This is like our present conception of the species, and identical with specimens in the Cambridge Museum of Comparative Zoology labeled with Chambers' manuscript name *Microæthia amphicarpeæana*.† To Chambers is due the credit of the discovery of the food plant. A specimen compared with Clemens' type is in the U. S. National Museum.

Pigritia laticapitella Clemens.

One type without left wings, Clemens' No. 97; alar exp., 11 mm. Also another identical and perfect specimen, bearing Clemens' No. 210. Specimens compared with these are in the U. S. National Museum. Until further study of this and the other species of this group, Dr. Dietz's determinations and synonymy‡ must hold, but Clemens' types will probably cause some changes when the group is critically revised.

Parasia (?) subsimella Clemens.

One type, consisting only of head and thorax, and so greasy as to be of little value, Clemens' No. 98.

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* Trans Am. Ent. Soc., x, p. 195, 1882.
† Can. Ent., x, p. 76, 1878.
‡ Trans. Am. Ent. Soc., xxvii, p. 106, 1900.

The writer's determination* is substantiated, as far as can be, from the type. The species should be known as *Epithectis subsimella* Clemens.

Depressaria lecontella Clemens.

One good type, though the left wings are absent, Clemens' No. 99; alar exp., 24 mm.

This agrees with my conception.† Specimens, compared with the type, are in the U. S. National Museum.

Lithocolletis fitchella Clemens.

One type in good condition, Clemens' No. 102; alar exp., 7.5 mm.

This is the well known species described previously by Fitch under the preoccupied name *quercifoliella*,‡ and subsequently by Frey and Boll as *quercitorum*,§ as determined by Lord Walsingham. Bred specimens, compared with Clemens' type, are in the U. S. National Museum.

Lithocolletis tubiferella Clemens.

One type, hind wings and abdomen missing, Clemens' No. 101; alar exp., 8 mm.

Specimens of this interesting species, bred by the writer at Washington, D. C., and compared with Clemens' type, are in the U. S. National Museum.

Tisheria malifoliella Clemens.

One type, consisting of head and thorax only, Clemens' No. 103.

The type is of no value, but the species is known beyond doubt from Clemens' description of the moth and from its life history. Bred specimens are in the U. S. National Museum.

Antispila isabella Clemens.

One perfect type, Clemens' No. 104; alar exp., 7.5 mm.

Specimens compared with this type are in the U. S. National Museum, bred by the writer at Washington, D. C.

Aspidisca lucifluella Clemens.

Two types, one perfect, but not spread, the other without head and without the wings on the left side, Clemens' No. 114; alar exp., 4.5 mm.

Specimens compared with the types are in the U. S. National Museum.

The genus is now known as *Coptodisca* Walsingham.‖

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* Proc. U. S. Nat Mus., xxv, p. 819, 1903.
† Proc. U. S. Nat. Mus., xxiv, p. 745, 1902.
‡ Rep. Ins., N. Y., v, p. 327, 1859.
§ Stett. ent. Zeit., xxxiv, p. 207, 1873.
‖ Ent. Mo. Mag., xxxi, p. 41, 1895.

Parectopa lespedezæfoliella Clemens.

One type, without wings on the right side, Clemens' No. 106; alar exp., 7 mm.

Lord Walsingham has made* Clemens' *Parectopa robiniella* a synonym of this species as well as *Gracilaria mirabilis* Frey and Boll. My examination of Clemens' types of these two species does not tend to confirm this conclusion. In fact I think the differences pointed out in Clemens' description fully borne out by his types. However, not having any bred specimens of *lespedezæfoliella*, I prefer to leave the synonymy as it is. The genus *Parectopa* may yet be adopted; but in the meanwhile the species may be known as *Gracilaria lespedezæfoliella* Clemens.

Bucculatrix pomifoliella Clemens.

One good type, Clemens' No. 107; alar exp., 7.5 mm.

This represents our common apple *Bucculatrix*, described subsequently by Packard as *Lithocolletis curviliniatella*. Bred specimens, compared with the type, are in the U. S. National Museum.

Bucculatrix agnella Clemens.

One type in rather poor condition and lacking the left wings, Clemens' No. 108; alar exp., 7 mm.

I have not discovered any specimen of this species in the U. S. National Museum.

Machimia tentoriferella Clemens.

One type, lacking left wings, Clemens' No. 109; alar exp., 25 mm.

This is our well-known species, described later by Chambers as *Depressaria fernaldella*.† Lord Walsingham has made‡ *Depressaria confertella* Walker§ a synonym of this species. During a visit at the home of Prof. C. H. Fernald, I saw two specimens in his collection, not of this species, which Prof. Fernald had compared with Walker's type in the British Museum and which he has identified as *confertella* Walker. They certainly agree better with Walker's description than does *Machimia tentoriferella* Clemens. They agree well with Zeller's description of *Cryptolechia ferruginosa*, and I believe they are that species, in which case the name *ferruginosa* would fall for the older name *confertella* Walker. At present, however, before Walker's type has been re-examined to find which of the two gentlemen was right in his determination, it is proper to leave the synonymy as first determined. A large series, identical with Clemens' type of *Machimia tentoriferella*, is in the U. S. National Museum.

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* Trans. Am. Ent. Soc., x, p. 193, 1882.
† Bull. U. S. Geol. Surv., iv, p. 82, 1878.
‡ Proc. Zool. Soc. Lond., p. 312, 1881.
§ Cat. Lep. Het. Brit. Mus., xxix, p. 363, 1864.

Psilocorsis quercicella Clemens.

One type, Clemens' No. 110; alar exp., 13 mm.

I have bred a very large series, at different times, of what is indisputably this species, from larvæ on oak. These specimens agree with Clemens' description and also with his type.

There is another very similar and equally common species, the larva of which also feeds on oak and occurs at the same time and same localities as *quercicella*. The imagoes of this species are exceedingly difficult to separate from *quercicella*. They are generally slightly larger (1 to 2 mm. additional expanse) and have the short black transverse lines less pronounced than in this species. They have the apical edge of the fore wing generally more distinctly blackish than it is in *quercicella*. The larvæ are quite different from the easily recognized larvæ of *quercicella*, with which they are often found, even between the same two leaves. These larvæ are white, with blackish brown head and slightly lighter brown thoracic shield, divided in the center by a straight longitudinal white line; the second thoracic segment is somewhat reddish laterally; the rest of the body is white, turning slightly rose-colored at maturity. In the larvæ of *quercicella* the three thoracic segments are black. This species, I am inclined to believe, is Zeller's *Cryptolechia obsoletella** with the description of which it agrees well.

Lord Walsingham made the following species synonymous with *quercicella* Clemens: (1) *Depressaria cryptolechiella* Chambers,† the food plant of which according to Chambers is holly; (2) *Hagno faginella* Chambers,‡ the larva of which feeds on beech: (3) *Cryptolechia cressonella* Chambers,§ which I believe with Chambers is the same as Zeller's erroneous conception of *quercicella;* (4) *Psilocorsis dubitatella* Zeller.‖ Finally Lord Walsingham identified¶ a species bred from *Ambrosia* as this same species. It is evident, as Lord Walsingham himself conceded,** that there is some mistake here. Zeller's conception of *Psilocorsis quercicella* Clemens, was clearly erroneous, as is shown by the measurement he gives of his specimen (length of fore wing 4‴), which would give an alar expanse of 19 mm. *Psilocorsis quercicella* varies only slightly in size, and the very largest specimen in a series of more than fifty has an expanse of only 15 mm., while the average size is a little more than 13 mm.

Zeller, probably, had before him the very similar but larger

*Verh. k. k. zool.-bot. Gesell. Wien, xxiii, p. 242, 1873.
† Can. Ent., iv, p. 91, 1873.
‡ Can. Ent., iv, p. 131, 1873.
§ Bull. U. S. Geol. Surv. Terr., iv, p. 86, 1878.
‖ Hor. Soc. Ent. Ross., xiii, p. 262, 1887.
¶ Ins. Life, ii, p. 151, 1890.
** Ins. Life, ii, p. 151, 1890.

Psilocorsis reflexella Clemens. The same reason suffices to disprove the synonymy of *faginella* Chambers, which has an expanse of $\frac{3}{4}$-inch = 19 mm.* and of any of those species treated by Chambers under that name.† Moreover, Chambers described the larva of *faginella*, and his description could not apply to *quercicella*. The size also eliminates Zeller's *Psilocorsis dubitella*, which, according to Zeller, has a wing length of 3.75 lines. Having not bred *faginella* nor *cryptolechiella* I am unable to pronounce on the synonymy of these species otherwise than that they are not the same as *quercicella* Clemens. I have bred, besides the two oak feeding species, two other extremely similar, but equally distinct, species of this group, one from *Amelanchier* and one from *Carpinus*, both with larvæ different from the oak feeding species. I venture to suggest the propriety of leaving all the species separate for the present.

Zeller at first included‡ both Clemens' genera *Psilocorsis* and *Machimia* in his *Cryptolechia*, but afterwards recognized them as valid genera§ but included the type of *Cryptolechia*, the African *straminella* Zeller,‖ in *Machimia*. Lord Walsingham showed¶ that *straminella* could not properly be included in *Machimia*, and placed it in *Psilocorsis*, dropping that genus as a synonym of *Cryptolechia*. This, however, seems unwarranted, considering the different palpi of this genus. *Psilocorsis* must stand, including the above-mentioned species and *ferruginella* Zeller (*confertella* Walker ?).

Psilocorsis reflexella Clemens.

Two types, both unspread, one without the wing on the right side, Clemens' No. 112; alar exp., 22 mm.

A specimen compared with the types is in the U. S. National Museum. According to the conclusions expressed under the foregoing species, *Psilocorsis quercicella* Zeller (*nec* Clemens) and *cressonella* Chambers would be synonymous with the present species.

Menesta tortriciformella Clemens.

One type without abdomen and wings on the right side, Clemens' No. 100; alar exp., 9.5 mm.

This type agrees with the present conception of the species.** Lord Walsingham established the undoubtedly correct synonymy

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* Can. Ent., iv, p. 92, 1872.
† Bull. U. S Geol. Surv., iv, pp. 84–86, 1878.
‡ Verh. k. k. zool.-bot. Gesell. Wien, xxiii, p. 239, 1873.
§ Hor. Soc. Ent. Ross., xiii, p. 259, 1887.
‖ Hand. Kong. Svensk. Acad., p. 107, 1852.
¶ Ins. Life, ii, p. 151, 1890.
** Proc. U. S. Nat. Mus., xxv, p. 902, 1902.

with *Gelechia liturella* Walker,* and with *Hyale coryliella* Chambers.†

The National Museum possesses a specimen which has been compared with Clemens' type.

Nepticula rubifoliella Clemens.

One type, lacking the right fore wing, Clemens' No. 113; alar exp., 4 mm.

I have not bred this species and am at present unable to give an opinion on the synonymy with the European *Nepticula angulifasciella*, which Clemens suggested.

Opostega albogaleriella Clemens.

One type, Clemens' No. 120; alar exp., 5.7 mm.

I have collected this species repeatedly at light in the District of Columbia. Clemens' description does not mention the apical costal and dorsal streaks, but they are present in his type, though very faint, because the specimen is rubbed. Nevertheless, Frey was fully justified in separating his *Opostega accessoriella*‡ from Clemens' species, from which it differs by the dark dorsal spot; but Frey evidently did not know of Chambers' *Opostega quadristrigella*.§ It is the same as Frey's species, as the description shows.

Of the two remaining American species placed in *Opostega*, *nonstrigella* Chambers is the only one that truly belongs to this genus. It differs from Clemens' species by the dark dorsal patch, and from *quadristrigella* by the absence of apical markings. *Bosquella* Chambers is, as originally described by Chambers,‖ a *Nepticula* and is the same as that previously described by Zeller as *Trifurcula obrutella*,¶ as the type of this species in the Cambridge Museum proves.

Representatives of all these species, collected by the writer in the District of Columbia and in Kentucky, are in the U. S. National Museum.

Trichotaphe alacella Clemens.

One type, Clemens' No. 115; alar exp., 13.5 mm.

This type confirms the present conception of this well known species. Specimens compared with it are in the U. S. National Museum. *Gelechia ochripalpella* Zeller,** and *Gelechia goodelliella* Chambers,†† are synonyms of this species.

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* Cat. Lep. Brit. Mus., xxix, p. 591, 1864.
† Cinn. Quart. Journ. Sci., ii, p. 242, 1875.
‡ Stett. ent. Zeit., xxxvii, p. 216, 1876.
§ Cinn. Quart. Journ. Sci., ii, p. 106, 1875.
‖ Bull. U. S. Geol. Surv., iv, p. 106, 1878
¶ Verh. k. k. zool.-bot. Gesell. Wien., xxiii, p. 316, 1873.
** Verh. k. k. zool.-bot. Gesell. Wien., xxiii, p. 279, 1873.
†† Journ. Cinn. Soc. Nat. Hist., iii, p. 289, 1881.

Solenobia walshella Clemens.

One type, of little value, both fore wings and right hind wing missing, the specimen glued on a triangle; Clemens' No. 121. The case of this species and pupa skin in good condition are found separate under Clemens' No. 122.

Though the type is of little use for identification, there is no doubt about this well known species. The genus *Solenobia** is now included in the Psychidæ.

Nepticula fuscotibiella Clemens.

One type, right fore wing missing, Clemens' No. 123; alar exp., 4 mm.

This is a true *Nepticula*, of which I have at present no other representative.

Nepticula bifasciella Clemens.

One type without right fore wing, Clemens' No. 124; alar exp., 4.5 mm.

I have no specimen of this species at present, but I have kept sketches and descriptions in my note book, as well as of all others not represented in the U. S. National Museum.

Nepticula platanella Clemens.

One perfect type, Clemens' No. 118; alar exp., 7 mm.

I have bred this common species repeatedly from the large, nearly circular, upper surface, blotch mines on sycamore, near Washington. Bred specimens compared with the type are in the U. S. National Museum.

Lyonetia speculella Clemens.

One type, without wings on left side, Clemens' No. 119; alar exp., 10 mm.

This is clearly the same species subsequently described by Packard as *Lithocolletis nidificansella*, and this is, as suggested by Chambers, also synonymous with his *Lyonetia gracilella; Lyonetia apicistrigella* Chambers, the type of which I have examined in the Cambridge Museum of Comparative Zoology, is another synonym. This reduces the six species recorded in Dyar's List of North American Lepidoptera, 1903, p. 563, to three, viz., *Lyonetia speculella* Clemens, *Lyonetia alniella* Chambers,† and *Lyonetia latistrigella* Walsingham.‡

Tenaga pomiliella Clemens.

One type without left wings, Clemens' No. 117; alar exp., 12 mm.

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* Tutt, Brit. Lep., ii, p. 155, 1900.

† Cin. Quart. Journ. Sci., ii, p. 303, 1875. The type in the Cambridge Museum shows the species to be quite distinct.

‡ Trans. Am. Ent. Soc., x, p. 203, 1882. There is a type (cotype ?) of this, labeled by Lord Walsingham, in the Philadelphia collection.

I had never seen an example of this striking species. It is well described by Clemens. The genus belongs among the narrow winged genera near *Tinea*.

Hybroma servulella Clemens.

One type, badly broken, Clemens' No. 116; alar exp., 11 mm.

Specimens of this easily recognized species, compared with Clemens' type, are in the U. S. National Museum.

Strobisia levipedella Clemens.

One perfect type. Clemens' No. 182; alar exp., 11 mm.

This confirms our present conception of the species, which, as determined by the writer,* belongs to the genus *Anacampsis* Curtis.

Parectopa robiniella Clemens.

Two good types, Clemens' No. 183; alar exp., 6.5 mm.

See preceding note under *Parectopa lespedezæfoliella* Clemens.

Brenthia inflatella Clemens.

One type without the left wings, Clemens' No. 181; alar exp., 12 mm.

This type agrees with the present conception of *Choreutis inflatella* as defined by Mr. W. D. Kearfott,† and is presumably only a variety of the more common form, subsequently described by Clemens as *Brenthia virginiella*.

Coleophora leucochrysella Clemens.

One type, without right fore wing, Clemens' No. 180; alar exp., 14.5 mm.

I have seen no other specimen of this fine species. As an aid to identification it may be added to Clemens' description that the underside of the fore wings is dark fuscous, except the apical fifth part, which is pure white.

Coleophora concolorella Clemens.

One type, left fore wing missing, Clemens' No. 179; alar exp., 10 mm.

I have no specimen exactly like this small, unicolorous, inconspicuous species.

Marmara salictella Clemens.

Clemens' type No. 125 of this species is lost, but no difficulty is met with in identifying the insect from the careful description and from the knowledge of its remarkable life history, so well given by Clemens. The writer has bred it for several seasons and gave some notes before the Washington Entomological Society on its unique mode of ornamenting its cocoon, which deserves fuller treatment. Such will be given shortly in a separate paper.

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* Can. Ent., xxxiii, p. 15, 1901.

† Journ. N. Y. Ent. Soc., x, p. 110, 1902.

Glyphipteryx impigritella Clemens.

One perfect type, Clemens' No. 178; alar exp., 7.5 mm.

A specimen determined by Lord Walsingham and agreeing with Clemens' type is in the U. S. National Museum. Also specimens collected at light, Washington, D. C., by the writer. Chambers made* his *Glyphipteryx exoptatella* a synonym of this species.

Gelechia nigratomella Clemens.

One type, Clemens' No. 187; alar exp., 11 mm.

This type proves the present conception correct, and the species should be known as *Aproærema nigratomella*. Specimens compared with Clemens' type are in the U. S. National Museum.

Gelechia mediofuscella Clemens.

One type, Clemens' No. 188; alar exp., 14 mm.

This confirms the present conception of the species, and is a true *Gelechia*, the same as the subsequently described *Gelechia vagella* Walker, *Depressaria fuscoochrella* Chambers and *Gelechia liturosella* Zeller. Specimens compared with Clemens' type are in the U. S. National Museum.

Gelechia fuscopunctella Clemens.

One type without wings on the left side, Clemens' No. 185; alar exp., 13 mm.

This is, as shown elsewhere by the writer, a *Telphusa*, very close to but different from *Telphusa quercinigracella* Chambers. A series, bred from oak in the District of Columbia, and compared with Clemens' type, is in the U. S. National Museum.

Gelechia gilvomaculella Clemens.

One type without head or the wings of the left side, Clemens' No. 190; alar exp., 14.5 mm.

This proves the species a true *Gelechia* and the same as the subsequently described *Gelechia biminimaculella* Chambers. Specimens compared with both Clemens' and Chambers' types are in the U. S. National Museum.

Gelechia longifasciella Clemens.

One type without head, otherwise in good condition, Clemens' No. 192; alar exp., 17 mm.

This confirms the present conception of the species.† It is the same as *Telphusa curvistrigella* Chambers, and consequently type of that genus. Specimens compared with the types of both authors are in the U. S. National Museum, collected by Miss Mary Murtfeldt, of Kirkwood, Mo.

Gelechia labradoriella Clemens.

One type without left wings, Clemens' No. 186; alar exp., 17 mm.

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* Can Ent., xiii, p. 193, 1881.

† Busck, Proc. U. S. Nat. Mus., xxv, p. 785, 1902.

This proves the synonymy with the European *Gelechia viduella* Fabricius, as suggested in Staudinger and Rebel's Catalogue of the Lepidoptera of Europe. The species must be known under the earlier name.

Phyllocnistis liriodendronella Clemens.

One perfect type, Clemens' No. 177; alar exp., 5.5 mm.

Specimens, bred from tulip tree in the District of Columbia and compared with Clemens' type, are in the U. S. National Museum.

Tisheria quercitella Clemens.

One type with wings not fully expanded, as described by Clemens; his No. 184; alar exp., 7 mm.

This species has been treated already under *Tisheria citripennella* Clemens. It is not synonymous with that species, as hitherto considered, but with the subsequently described *Tisheria tinctoriella* Chambers.

Gelechia angustipennella Clemens.

One type, left wings missing, Clemens' No. 194; alar exp., 13 mm.

This proves to be the species described by the writer as *Aristotelia kearfottella*,* which name consequently falls as a synonym. The species should be known as *Aristotelia angustipennella*. Specimens compared with Clemens' type are in the U. S. National Museum.

Gelechia apicilinella Clemens.

Clemens' type No. 195 is lost, and the species must remain, as placed by Riley, a synonym of *Aproærema nigratomella* Clemens.

Gelechia pullifimbriella Clemens.

One type, Clemens' No. 191; alar exp., 12 mm.

This proves the species to be a small, inconspicuous, nearly unicolorous *Gelechia*, different from any with which I am acquainted. I have no specimens exactly like the type which is well described by Clemens.

Holcocera chalcofrontella Clemens.

Two types, Clemens' Nos. 201 and 202, the latter marked "light variety"; alar exp., 15 mm.

Chambers suggested that his species *Holcocera clemensella* might be a variety of *chalcofrontella*, and he later reasserted this opinion.† In Cambridge, Mass., I examined Chambers' type, which is in very indifferent condition, but inasmuch as neither this type nor Chambers' description disagrees with undoubted specimens of *chalcofrontella*, it seems proper to regard the two names as synonyms. Specimens compared with the types of both authors are in the U. S. National Museum.

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* Proc. U. S. Nat. Mus., xxv, p. 803, 1902.

† Cinn. Quart. Journ., ii, p. 256, 1875.

Holcocera purpurocomella Clemens.

One type without wings on the right side, Clemens' No. 200; alar exp., 16 mm.

This type proves the species to be the same as the subsequently described *Blastobasis quiesquiella* Zeller. Specimens compared with Clemens' type and previously found identical with Zeller's type in the Cambridge Museum, are in the U. S. National Museum.

Holcocera gilbociliella Clemens.

One perfect type, Clemens' No. 203; alar exp., 13.5 mm.

Zeller rightfully separated his *Blastobasis livorella* from this species, which lacks the two dark dots at the end of the cell and which is quite distinct from any other described American species. A specimen compared with Clemens' type is in the U. S. National Museum.

Holcocera modestella Clemens.

One type without wings on left side, Clemens' No. 204; alar exp., 16 mm.

This proves, as suspected by Zeller, to be the same as his *Blastobasis nubilella*, the type of which I have examined in the Cambridge Museum. It is also the same as *Holcocera glandulella* Riley, as suggested by Lord Walsingham.* A large bred series, compared with the types of both authors, is in the U. S. National Museum.

While treating this group I may add that *Blastobasis sciaphilella* Zeller† is the same as *Holcocera triangularisella* Chambers,‡ as types of both species in Cambridge prove. Chambers' suggestion§ that it is a variety of *glandulella* Riley (*modestella* Clemens) is not substantiated. All of the species here mentioned belong to *Holcocera* Clemens.

Ypsolophus punctidiscellus Clemens.

One perfect type, Clemens' No. 205; alar exp., 15 mm.

This substantiates the present conception of the species. Specimens compared with the type are in the U. S. National Museum.

Ypsolophus pauciguttellus Clemens.

Two perfect types, Clemens' No. 206; alar exp., 17 mm.

This is the common apple feeder, at once recognized by the semi-transparent, bluish hind wings. It should be known as *Ypsolophus ligulellus*. For full synonymy see my Revision of American Gelechiidæ.‖

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* Trans. Am. Ent. Soc., x, p. 191, 1882.

† Verh. k k. zool.-bot. Gesell. Wien., xxiii, p. 295, 1875.

‡ Cinn. Quart. Journ., ii, p. 256, 1875.

§ Can. Ent., ix, p. 71, 1877.

‖ Proc. U. S. Nat. Mus., xxv, p. 921, 1902.

Ypsolophus unicipunctellus Clemens.

One type, lacking the left wings, Clemens' No. 207; alar exp., 22 mm.

This type substantiates the present conception of the species as synonymous with the previously described *Chætochilus ventrellus* Fitch, under which specific name the species should be known. Compared specimens are in the U. S. National Museum.

Depressaria atrodorsella Clemens.

Two types, Clemens' No. 174; alar exp., 21 mm.

These verify the writer's conception of this species.* Specimens compared with the types are in the U. S. National Museum.

Enicostoma packardella Clemens.

One type without right wings, Clemens' No. 208; alar exp., 25 mm.

Specimens of this well known species, compared with Clemens' type, are in the U. S. National Museum. It is now known as *Semioscopis packardella*,† and is the same as the subsequently described *Epigraphia eruditella* Grote.

Brachiloma unipunctella Clemens.

One type, wings on right side missing, Clemens' No. 212; alar exp., 20 mm.

This is, as I had anticipated from Clemens' description, the same species described by Zeller as *Cryptolechia lithosina*, and by Chambers as *Harpalyce tortricella*. Both of these names, as well as the generic name *Ide*, substituted by Chambers for the preoccupied *Harpalyce*, must be dropped for the earlier one of Clemens. The genus belongs to the family *Xyloryctidæ* Meyrick. Specimens, compared with Clemens' type and with the types of Chambers and Zeller in the Cambridge Museum, are in the U. S. National Museum.

Pigritia ochrocomella Clemens.

One type without wings on left side, Clemens' No. 209; alar exp., 10 mm.

Placed by Dr. Dietz as *Dryope ochrocomella*.‡ Specimens carefully compared with Clemens' type are in the U. S. National Museum.

Pigritia ochrella Clemens.

One type, right wings missing, Clemens' No. 211; alar exp., 12 mm.

Placed by Dr. Dietz in the genus *Dryope* Chambers. Carefully compared specimens are in the U. S. National Museum.

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* Proc. U. S. Nat. Mus., xxiv, p. 736, 1902.
† Dyar, Can. Ent., xxxiv, p. 319, 1902.
‡ Trans. Am. Ent. Soc., xxvii, p. 117, 1901.

Tinea acapnopennella Clemens.

One type, Clemens' No. 213; alar exp., 14 mm.

Specimens, determined by Lord Walsingham and agreeing with this type, are in the U. S. National Museum.

Homosetia tricingulatella Clemens.

One type, wings on left side lacking, Clemens' No. 198; alar exp., 11 mm.

This is the same species as described by Chambers subsequently as *Pitys miscecristatella*. Chambers called attention to the similarity of both his genus and species to Clemens' form, but very excusably separated his genus, judging as he did only from Clemens' description, which omits any mention of the characteristic tufts of raised scales, though they are found in the types. I am unable to find any justification for the genus *Semele* Chambers,* which Chambers later confessed† was probably not well separated from *Pitys*. I have examined the type of *Semele cristatella* Chambers, which is the type of the genus. It agrees in every respect generically with *Pitys*. Both of these genera fall before Clemens' earlier *Homosetia*. Specimens collected at Washington, D. C., and in Kentucky, are in the U. S. National Museum.

Homosetia costisignella Clemens.

One type without wings on left side, Clemens' No. 199; alar exp., 11 mm.

This is without doubt the same as *Pitys fasciella* Chambers. Specimens compared with Clemens' type are in the U. S. National Museum.

Chauliodus (?) **canicinctella** Clemens.

One type consisting only of thorax and right fore wing, Clemens' No. 214; alar exp., 10 mm.

In spite of its poor condition, the type will ultimately enable identification, as the coloration of the fore wing is quite striking, and well described by Clemens. I have at present no specimen like it, and cannot give any definite opinion on its generic position. If Clemens' generic description is correct, as is probably the case, the species cannot be included in *Epermenia* Hübner (*Chauliodus* Treitsche).

Ornix boreasella Clemens.

One type, head, abdomen, and right wings missing, Clemens' No. 217; alar exp., 9 mm.

I have no specimen like this. The species must be retained provisionally in the genus *Ornix*, though Clemens' description and what is left of his type, indicate that it cannot belong there.

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* Cinn. Quart. Journ. Sci., ii, p. 243, 1875.
† Can. Ent., ix, p. 208, 1877.

Incurvaria labradorella Clemens.

One type without wings on left side, Clemens' No. 215; alar exp., 7 mm.

This species has already been treated. It may at present be retained in *Incurvaria*. It is a striking species, agreeing well with Clemens' description. No other specimen of the species is known to the writer.

Gelechia brumella Clemens.

One type, right fore wing missing, Clemens' No. 196; alar exp., 23 mm.

I have no specimen like this, which proves the species to be a true *Gelechia*, near *vernella* Murtfeldt. It is, however, a much larger and darker species. I know of no other examples.

Walshia amorphella Clemens.

Two types, Clemens' No. 225; alar exp., 17 mm.

A bred series of this species, compared with Clemens' type, is in the U. S. National Museum. I have examined the types in the Cambridge Museum of *Laverna miscecolorella* Chambers, which represent the same species, as shown by Lord Walsingham.*

Gelechia (?) ornatifimbriella Clemens.

One type, Clemens' No. 228; alar exp., 17 mm.

This proves to be the same species described by Zeller as *Gelechia unctella*. A bred series, compared with the types of both authors, is in the U. S. National Museum.

Gelechia gallægenitella Clemens.

One type, left wings missing, Clemens' No. 229; alar exp., 10.5 mm.

This type confirms my identification of the species.† It should be known as *Epithectis gallægenitella* Clemens. Bred specimens, compared with the type, are in the U. S. National Museum. The specimens subsequently described by Clemens as this species, bred from willow galls, presumably do not belong here, and Clemens' description should, therefore, be disregarded. These specimens are not found now with Clemens' types.

Gracilaria coroniella Clemens.

One type, both fore wings and one hind wing missing, Clemens' No. 226.

Lord Walsingham determined with some doubt‡ the common birch *Gracilaria* of the Eastern States as *Gracilaria coroniella*. Inasmuch as this agrees with Clemens' description and with what is left of his type, this determination is probably correct and should be accepted. Bred specimens from Washington, D. C., are in the U. S. National Museum.

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* Trans. Am. Ent. Soc., x, p. 197, 1882.

† Proc. U. S. Nat. Mus., xxv, p. 819, 1892.

‡ Trans. Am. Ent. Soc., x, p. 192, 1882.

Depressaria pulvipennella Clemens.

One type, Clemens' No. 227; alar exp., 20 mm.

This confirms my present conception of the species. Specimens compared with the type are in the U. S. National Museum.

Depressaria cinereocostella Clemens.

One type, Clemens' No. 173; alar exp., 17 mm.

The writer's conception of this species is verified. A bred series, compared with type, is in the U. S. National Museum.

Hamadryas bassettella Clemens.

Two types, Clemens' No. 221; alar exp., 14 mm.

A bred series of this striking but common species is in the U. S. National Museum. It is known now under the generic name *Euclemensia* Grote,* *Hamadryas* being preoccupied.

Cycloplasis panicifoliella Clemens.

Two types with cases, Clemens' No. 219; alar exp., 4.5 mm.

Specimens bred by the writer at Washington, D. C., and compared with Clemens' types of this remarkable little species, are in the U. S. National Museum.

Elachista brachyelytrifoliella Clemens.

One type, right wings and abdomen missing, Clemens' No. 218; alar exp., 6 mm.

I have no specimen of this species, and the type is in rather poor condition for identification; still the recognition of the species is assured from the knowledge of its food plant, together with Clemens' description.

Adela ridingsella Clemens.

One type, Clemens' No. 171; alar exp., 15.5 mm.

Specimens compared with the type are in the U. S. National Museum. Lord Walsingham has pointed out† the synonymy of *Adela schlægeri* Zeller and *Dicte coruscifasciella* Chambers with this species.

Coleophora rosæfoliella Clemens.

One type with its case, Clemens' No. 216; alar exp., 12.5 mm.

I have no specimen of this species.

Coleophora rosacella Clemens.

Three types, Clemens' Nos. 166, 168 and 170; also two cases numbered 167 and 169. No. 170 represents Clemens' variety; alar exp., 12 mm.

Not having bred material of this species I am at present unable to give a final opinion about the supposed variety. It seems to be specifically distinct.

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* Can. Ent., x, p. 69, 1878.

† Proc. Zool. Soc. Lond., p. 79, 1880.

Dasycera newmanella Clemens.

One type, Clemens' No. 172; alar exp., 17.5 mm.

Specimens compared with the type of this well known species are in the U. S. National Museum. The genus *Dasycera* Haworth has been made synonymous with *Œcophora* Latreille by European authors. The present species should be known under that generic name.

The only other American species described as *Dasycera*, namely *nonstrigella* Chambers, belongs, as I have shown,* to the Gelechiid genus *Trichotaphe* Clemens. The other American species hitherto placed in *Œcophora* should be placed temporarily in *Borkhausenia* Hübner, following European microlepidopterists. Future study will surely cause these species to be distributed in more than one genus. I cannot understand how European specialists, such as Meyrick and Rebel, have left in one genus species so widely separated as *pseudospretella* Stainton and *borkhausenii* Zeller. The former has 12 veins in fore wings and veins 3 and 4 in hind wings stalked like the type of the genus *similella* Hübner, while the latter has only 11 veins in fore wings (vein 8 absent) and veins 3 and 4 in hind wings separate. *Œcophora boreasella* Chambers is, as proven by the description and by Chambers' type in Cambridge, the same as *borkhausenii* Zeller.

Wilsonia brevivittella Clemens.

Two perfect types, Clemens' No. 175; alar exp., 12 mm.

Bred specimens of this common species compared with the types are in the U. S. National Museum. The genus *Wilsonia* can hardly be retained, as it agrees in all essential characters with *Mompha* Hübner, under which genus the species should be placed. Lord Walsingham made† *Laverna œnotheræseminella* Chambers and *Laverna œnotherævorella* Chambers, synonyms of Clemens' species.

Ypsolophus flavivittellus Clemens.

No type is found of this species, but there is no doubt about its identity with *Ypsolòphus ligulellus* Hübner, under which name it should be known.

Anesychia sparsiciliella Clemens.

Two types, Clemens' No. 165; alar exp., 18 and 20 mm.

The synonomy with *Cryptolechia contrariella* Walker and with *Cryptolechia atropicta* Zeller, as pointed out by Lord Walsingham,‡ is evidently correct, as well as the generie position assigned by him. The species should be known as *Cryptolechia contrariella* Walker. Specimens, compared with Clemens' type, are in the U. S. National Museum.

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* Proc. U. S. Nat. Mus., xxv, p. 910, 1902.
† Trans. Am. Ent. Soc., x, p. 196, 1882.
‡ Proc. Zool. Soc. Lond., p. 85, 1880.

Elachista (?) orichalcella Clemens.

One type in poor condition and without wings on left side, Clemens' No. 421 ; alar exp., 6 mm.

Not having any material of this species for structural study, I am unable to pronounce on Stainton's opinion that it is probably not an *Elachista*. The type has the general aspect of this genus, but is not in sufficiently good condition to furnish information on the generic characters.

Brenthia virginiella Clemens.

One specimen (type?) with Clemens' label, but without his usual number; in poor condition, left wings missing and right wings rubbed; alar exp., 10 mm.

This is the same, as far as the condition allows determination, as the present conception of the species, namely, a variety of the previously described *Brenthia inflatella* Clemens.*

Gracilaria blandella Clemens.

The type of this species is lost.

The walnut feeder, suggested by Chambers to be this species, and redescribed by him† with his provisional name *juglandivorella*, agrees well with Clemens' description, and his name should stand for the species. Bred specimens are in U. S. National Museum from Washington, D. C.

Tinea tapetzella Linnæus.

The specimen identified by Clemens as this species, bearing his No. 126, is found in good condition and proves it to be the European species, which is now known under the generic name *Trichophaga* Ragonot. The species supposed to be a variety of it, *Tinea occidentella* Chambers, is a quite distinct *Tinea*, as Chambers' type in Cambridge proves.

Coleophora cratipennella Clemens.

One perfect specimen, thus labeled by Clemens but without any number, is found in the collection. It agrees with Clemens' description and undoubtedly represents the species, though it may not be the original type. Alar. exp., 14 mm.

Specimens collected by the writer at Washington, D. C., and compared with Clemens' specimen are in the U. S. National Museum. Chambers' type of *Coleophora gigantella* is there also. It proves synonymous with *cratipennella* as the descriptions would indicate.

Gelechia fungivorella Clemens.

Four types, Clemens' Nos. 455, 456, 457, and 458 ; alar exp., 12 mm.

These agree with my conception of *Aristotelia fungivorella* and with my bred specimens, but are very distinct from the following species with which I had associated it.

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* Kearfott, Journ. N. Y. Ent. Soc., x, p. 111, 1902.

† Can. Ent., v, p. 13, 1873.

Gelechia salicifungiella Clemens.

One perfect type, Clemens' No. 459; alar exp., 12.5 mm.

In the absence of any specimens, and following Clemens' own suggestion, which his description seemed to substantiate, I had made this species a variety of the foregoing, *Aristotelia fungivorella* Clemens. The type, however, shows this conclusion to be entirely wrong; *salicifungiella* is a very distinct *Aristotelia*, easily recognized by its showy brick red ground color. A specimen, compared with the type, is in the U. S. National Museum.

Batrachedra salicipomonella Clemens.

Four types, Clemens' Nos. 413 and 415; alar exp., 12 mm.

I have bred this species from saw fly galls on willow at Washington, D. C.*

Nepticula saginella Clemens.

One type, Clemens' No. 420; alar exp., 4 mm.

I have no specimen like this type. The knowledge of the food plant and Clemens' description, however, insure recognition of this well marked species.

Bucculatrix trifasciella Clemens.

One type, Clemens' No. 416; alar exp., 7.5 mm.

Bred specimens from Washington, D. C., compared with Clemens' type, are in the U. S. National Museum.

Incurvaria mediostriatella Clemens.

One type without wings on right side, Clemens' No. 418; alar exp., 9 mm.

Though differing slightly in venation, as pointed out by Clemens, this species may, provisionally at least, be retained in *Incurvaria*. *Tinea auristrigella* Chambers and *Lecithocera flagistrigella* Walsingham have been made synonyms of this species. The type of the latter is in the collection of the Philadelphia Academy and agrees with Clemens' type. Identical specimens are in the U. S. National Museum.

—Mr. Ashmead exhibited specimens representing nine new genera of Cynipoidea and commented upon their peculiarities. Descriptions of these genera are contained in the following paper:

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* Probably *Pontania hyalina* Norton. See Marlatt, U. S. Dept. Agriculture, Div. Ent, Technical ser., No. 3, p. 37, 1896.—Publication committee.

SOME NEW GENERA IN THE CYNIPOIDEA.

By William H. Ashmead.

Family FIGITIDÆ.

Subfamily FIGITINÆ.

Kiefferiella, n. n. (= *Kiefferia* Ashm., preoc. in Diptera).

This genus comes next to *Figites* Latreille, but is quite distinct in having the head and thorax coarsely rugosely punctate, by the antennæ being filiform, thc joints cylindrical, the third *shorter* than the fourth, and by the abdomen being compressed, the second segment being as long as 3 and 4 united.

Type: K. rugosa Ashm., taken in the Santa Cruz Mts., California.

The genus is dedicated to Abbé J. J. Kieffer, Professor at Bitche, Deutsch-Lothringen, who has so ably monographed the European Cynipidæ.

Subfamily EUCOILINÆ.

Zamischus Ashmead.

The type of this genus, *Z. brasiliensis*, was taken by Mr. Herbert H. Smith in Brazil, and is the most striking form yet discovered in this group, being unique and quite unlike any other known Eucoiline. The metathorax is produced posteriorly into a long neck, the length of the hind coxæ, while the abdomen is attached to this by an abnormally long, slender and smooth petiole the length of the body; the antennæ and the venation of the front wings are also peculiar, the former being very long, gradually thickened towards apex, while the costal and marginal cells are confluent, the marginal cell being only partially formed, entirely open all along the front margin, much as in *Onychia* Haliday. It shows some affinity with the Liopterinæ.

Type: Z. brasiliensis Ashm. (Chapada, Brazil.)

Tropideucoila Ashmead.

This genus is allied to *Disorygma* Förster, but is easily separated by having 5 longitudinal carinæ on the mesonotum, and by the scutellum being bidentate. The antennæ are 13-jointed, filiform.

Type: T. rufipes Ashm. (Chapada, Brazil.)

Promiomera Ashmead.

Allied to *Miomera* Förster but easily separated by the antennæ, which, in the ♀, are 11-jointed, filiform, tapering off at apex; in ♂, long, 13-jointed, the third joint very much shorter than the fourth.

Type: P. filicornis Ashm. (Chapada, Brazil.)

Odonteucoila Ashmead.

This genus is easily recognized by the scutellum which ends in a tooth or spine, and by the antennæ which are long, filiform, with the third joint much *shorter* than the fourth.

Type: O. chapadæ Ashm. (Chapada, Brazil.)

Trissodontaspis Ashmead.

The scutellum in this genus is unique in the group, the cup being modified into a carina which is gradually dilated posteriorly and ends in a tooth-like projection, while the scutellum proper has a tooth each side posteriorly, the scutellum thus appearing as if tridentate, when viewed from above. The antennæ are unusually long, the joints being long and cylindrical, the third joint slightly curved; the pronotum is elevated into a sharp ridge and deeply emarginate medially, while the mesonotum is longer than wide.

Type: T. rufipes Ashm. (Chapada, Brazil.)

Dieucoila Ashmead.

This genus differs from all others by having the head and thorax finely, opaquely sculptured, by the scutellum, which has two large, oblong shallow foveæ at base, and by peculiarities of the antennæ, which are long, the joints cylindrical, long, but gradually thickened, the third joint a little shorter than the fourth.

Type: D. subopaca Ashm. (Chapada, Brazil.)

Zaeucoila Ashmead.

This genus is easily known by its short, robust form, by the short *closed* marginal cell, which is hardly longer than wide, the second abscissa of the radius being rather strongly curved outwardly and by the short mesonotum which has a delicate carina down the center, the cup of the scutellum being large, almost round.

Type: Z. unicarinata Ashm. (Rio de Janeiro.)

Pseudeucoila Ashmead.

This genus is proposed for a number of species placed at present in the genus *Eucoila* Dalla Torre and Kieffer, but *not* Westwood. The type of *Eucoila* Westwood is *E. crassinervis* Westw., and *Psilodora* Förster is a synonym of it. In *Pseudoeucoila* the wings are pubescent and the marginal cell is closed.

Type: Eucoila (*Cothonaspis*) *trichopsila* Hartig.

The paper was discussed by Drs. Gill and Howard. Speaking of gall-wasps, Mr. Ashmead stated that the so-called "potato gall" (*Tribalia batatorum* Walsh), which was in reality a root-gall on *Rubus* or *Rosa*, was described and named by Walsh from specimens given him by a farmer who reported that they were

taken on a potato. It really represents a subgenus of *Rhodites* with an open marginal cell. Abbé Kieffer has rechristened this subgenus *Lytorhodites*.

Dr. Dyar presented the following paper:

LIST OF LEPIDOPTERA TAKEN AT WILLIAMS, ARIZONA, BY MESSRS. SCHWARZ AND BARBER.—I. PAPILIONOIDEA, SPHINGOIDEA, BOMBYCOIDEA, TINEIOIDEA (in part).

By Harrison G. Dyar.

Messrs. Schwarz and Barber collected insects at Williams, Arizona, in the summer of 1901. The following list of 139 species comprises the "Macrolepidoptera" and part of the "Microlepidoptera" taken by them. We hope to have Mr. Busck get the rest of the "Microlepidoptera" in shape to present a list later. The numbers preceding the names are those of the catalogue, Bulletin 52, U. S. National Museum.

Superfamily *PAPILIONOIDEA*.

10. **Papilio rutulus** Boisd., var. **arizonensis** Edw.
28. **Neophasia menapia** Feld.
41. **Nathalis iole** Boisd.
81. **Pyrisita mexicana** Boisd.
182. **Schoenis minuta** Edw.
192. **Phyciodes camillus** Edw.
216. **Eugonia californica** Boisd.
217. **Euvanessa antiopa** Linn.
221. **Vanessa cardui** Linn.
238. **Basilarchia weidemeyerii** Edw.
245. **Liminitis bredowii** Edw.
317. **Polystigma nais** Edw.
359. **Thecla blenina** Hew.
420. **Nomiades lygdamas** Boisd.
440. **Cyaniris ladon** Cram., var. **piasus** Boisd.
442. **Everes comyntas** Godt.
450. **Brephidium exilis** Boisd.
428. **Rusticus glaucon** Edw.
525. **Polites sabuleti** Boisd.
584. **Epargyreus tityrus** Fab.
601. **Thorybes pylades** Scudd.
626. **Thanaos petronius** Lint.

Like examples from Florida. *Propertius* is the species I should have expected from this region. The probability is that there are too many names for the forms of *Thanaos*.

Superfamily *SPHINGOIDEA*.

653. **Hemaris diffinis** Boisd., var. **thetis** Grt. and Rob.

Superfamily *BOMBYCOIDEA.*

790. **Lycomorpha grotei** Pack.
815. **Bruceia pulverina** Neum.
830. **Eubaphe ostenta** Hy. Edw.
888. **Apantesis nevadensis** Grt. and Rob.

One female, bred from a pupa found under a stone. Hind wings and subdorsal region of abdomen, yellow ; fore wings with basal bands broken, none of them distinctly crossing the submedian bar. It is probably referable to the form *superba* Str.

899. **Euverna clio** Pack.

Several examples, all of the white-hind-winged form.

930. **Euschausia argentata** Pack., var. **subalpina** French.
956. **Copidryas gloveri** Grt. and Rob.
1078. **Hadenella subjuncta** Smith.
1098. **Platyperigea discistriga** Smith.
1103. **Caradrina exigua** Hübn.
1105. **Caradrina extimia** Walk.
1125. **Perigea alfkenii** Grt.
1232. **Hadena devastatrix** Brace.

A little more pronounced in the black shadings than Eastern specimens.

1395. **Rhynchagrotis placida** Grt.
1467. **Peridroma margaritosa** Haw.
1496. **Noctua clandestina** Harr.
1798. **Noctua pyrophiloides** Harv.

One large female specimen of a delicate pinkish ground color rather than the gray clayey color of Pacific Coast specimens. I have a similarly colored male specimen from Bluff, Utah, taken by Mrs. H. M. Peabody, and I would designate this form as var. *peabodyæ.*

Type.—No. 6727, U. S. National Museum.

1501. **Noctua piscipellis** Grt.

Noctua amia, n. sp.

Allied to *piscipellis* and *atrifrons.* Front of head brown black, as dark as *piscipellis* , but the color extends uniformly over the head and collar, only fading on the disk of the thorax. Abdomen gray brown with reddish anal tuft. Fore wings with the ordinary spots obsolete; lines single, black, grayish edged, strongly dentate; veins lined in black outwardly; a faint pale subterminal line, nearly obsolete. Color of wing dark reddish brown, hoary gray shaded, much as in *piscipellis* but darker; the markings, however, are more as in *atrifrons.* Hind wing white, soiled with gray outwardly. Expanse, 37 mm.

Ten specimens, July 25.

Type.—No. 6728, U. S. National Museum.

1517. **Chorizagrotis auxiliaris** Grt.

1519. **Chorizagrotis agrestis** Grt.

These two forms seem not specifically distinct.

1526. **Rhizagrotis cloanthoides** Grt.

1533. **Rhizagrotis lagena** Grt.

1601. **Paragrotis punctigera** Walk.

1609. **Paragrotis nævulus** Smith.

Ten examples, quite variable, but all with the peculiar oval bare spot on the front as in the types. One specimen, bred from a pupa, has the hind wings nearly all gray. The others have them more white, some almost all white, except the veins, this irrespective of sex. The markings on the fore wings vary in distinctness.

1649. **Paragrotis messoria** Harr.

1707. **Paragrotis insulsa** Walk.

1724. **Paragrotis obeliscoides** Guen.

1759. **Ufeus plicatus** Grt.

1945. **Trichoclea antica** Smith.

2138. **Copicucullia antipoda** Strk.

2218. **Cosmia punctirena** Smith.

Six examples, varying in shade. I cannot see in this more than a variety of *C. paleacea* Esp.

2259. **Calymnia orina** Guen.

Several examples bred from larvæ on oak, mostly of the pale form *calami*.

Pseudacontia groteana, n. sp.

Black, thorax grayish; t. a. line obscure, fine, gray, waved; median space black, orbicular and reniform outlined in white; t. p. line distinct, white, even, strongly bowed out opposite the reniform, followed by white powdering. Subterminal line irregular, defined by the gray shading filling the terminal space. Expanse, 22 mm.

One male.

Type.—No. 6729, U. S. National Museum.

Looks like a large *Stylopoda cephalica* with less white. Must also resemble *aterrima* Grt., but the eyes are not ovate as Prof. Smith says those of *aterrima* are. Respectfully dedicated to Prof. A. R. Grote.

2444. **Basilodes chrysopis** Grt.

2448. **Stiria rugifrons** Grt.

2452. **Stibadium spumosum** Grt.

2496. **Autographa brassicæ** Riley.

2745. **Cissura inepta** Hy. Edw.

2839. **Catocala aspasia** Strk.

2860. **Catocala aholibah** Strk.

2991. **Homoptera calycanthata** Sm. & Abb.

3092. **Melalopha apicalis** Walk.

3113. **Hyperæschra tortuosa** Tepp.

3146. **Ianassa coloradensis** Hy. Edw.

3188. **Notolophus oslari** Barnes.

A dead male pupa and female larva in alcohol. These must represent *N. oslari*, though without a perfect male, I am not sure. A bred female was brought by Mr. Schwarz from Las Vegas, New Mexico, and another female was sent me by Prof. Cockerell from near the top of Tuerto Mt., near Santa Fé, New Mexico. These females have very dark abdominal clothing. The larva closely resembles that of *vetusta*. All were taken on *Abies concolor*.

3209. **Tolype glenwoodi** Barnes.

This seems to me only a variety of *velleda*.

3215. **Malacosoma fragilis** Str.
3388. **Hydriomena autumnalis** Ström.
3435. **Emplocia inconstans** Gey.
3447. **Ersephila indistincta** Hulst.

A fine fresh specimen, bred from oak.

3482. **Cosymbia serrulata** Pack.
3557. **Annemoria bistriaria** Pack.
3631. **Deilinia bifilata** Hulst.
3635. **Deilinia quadraria** Grt.
3647. **Sciagraphia granitata** Guen.
3662. **Sciagraphia atrofasciata** Pack.
3767. **Caripeta æqualiaria** Grt.
3770. **Phengommatæa gertruda** Hulst.
3773. **Platæa trilinearia** Pack.
3776. **Cymatophora sericeata** Hulst.

Four specimens, July 16–17, one labelled "bred from green and yellow banded larva on *Cowania mexicana*."

3791. **Alcis spododea** Hulst.

One ♂ specimen. The lines are a little more upright and straight than in Hulst's ♀ type before me and the median shade is broader; but there is obviously no specific difference.

3800. **Alcis haydenata** Pack.
3824. **Cœnocharis interruptaria** Grt.

Chesiadodes bidisata, n. sp.

Differs from Hulst's definition of the genus in having the front of head flat, but falls here in his synopsis, assuming that the ♀ (which I have not) has developed wings.

Head and thorax light gray, black sprinkled. Fore wings trigonate, light gray, densely sprinkled with black so as to appear dark stone gray. T.-a. line distinct, heavy, black, nearly straight, preceded by a broad aggregation of the dark scales, an aggregation of scales to form a broad, clouded, discal spot; t. p. line heavy, black, bent out far beyond the discal spot, curved inward in a low broad arc below the cell, even, not waved; a slight aggregation of black scales subterminally; a black terminal line broken at the veins. Hind wings whitish, sprinkled with gray, most so outwardly; a gray rounded discal spot and terminal blackish line. Beneath more whitish, the marks of fore wing very faintly reproduced, but those of the hind wing more distinct than above. Expanse, 30 mm.

One male.

Type.—No. 6730, U. S. National Museum.

3984. **Metanema excelsa** Strk.

Bred from a green larva on oak.

4007. **Caberodes confusaria** Hübn.

The specimens are all undersized.

There are, besides, one Noctuid in rather poor condition and two Geometrids not in the National Museum and which I cannot place by Hulst's tables, as but a single sex is before me.

Superfamily *TINEOIDEA* (in part).

4329. **Evergestis funalis** Grote.
4342. **Nomophila noctuella** Den. & Schiff.
4358. **Loxostege sticticalis** Linn.
4359. **Loxostege commixtalis** Walk.
4374. **Loxostege nasonialis** Zell.
4404. **Phlyctænia itysalis** Walk.
4476. **Cornifrons simalis** Grote.
4516. **Pyralis farinalis** Linn.
4614. **Thaumatopsis repandus** Grote.
4618. **Ommatopteryx ocelleus** Haw.
4727. **Ambesa lætella** Grt.
4849. **Hulstea undulatella** Clem.

Thirty-two specimens, the most abundant species of Lepidoptera in the collection. June and July.

Homœosoma elongellum, n. sp.

Near *uncanale* Hulst, but the wings longer and narrower and more whitish gray. Fore wing very narrow and elongate, stone gray, from rather sparse black scales on a gray white ground, less numerous along costal edge. Inner line whitish, very slightly produced outwardly centrally, followed by a broad black shade; two superposed black discal dots; outer line whitish, confused, not contrasted, edged within by black which runs obscurely to the discal dots at the slight upper indentation of the line; an obsolete lower indentation on submedian fold. Hind wing whitish, veins and margins gray. Expanse, 21–22 mm.

Three specimens, July 23 and 26.

Type.—No. 6746, U. S. National Museum.

Maricopa lustrella, n. sp.

♂, fore wings with 11 veins, 2 and 3 separate near end of cell, 4 and 5 stalked, 8 and 9 long stalked, 10 and 11 from cell; hind wings with 7 veins, 2 shortly before end of cell, 3 and 4 stalked. Palpi slender, closely scaled, projecting about the length of the head in front, porrect; tongue small, apparently coiled; antennæ simple, scarcely pubescent, slightly bent at base; wings elongate, trigonate.

Fore wing shining gray; ground color shining lilacine pale cinereous,

sprinkled with black scales; a black shade at base; inner line pale, a little oblique, waved inward on submedian fold, narrowly edged with black within and broadly so without; a rather large, diffuse, discal bar; outer line parallel to external margin, remote from inner line, pale, narrowly edged with black on both sides, slightly waved outward below cell. Hind wing translucent pale gray. Expanse, 20 mm.

One ♂, June 7.

Type.—No. 6747, U. S. National Museum.

4981. **Pterophorus monodactylus** Linn.
4982. **Pterophorus cretidactylus** Fitch.
4989. **Pterophorus grisescens** Wals.

Pterophorus barberi, n. sp.

Palpi and tongue pale, face red brown, vertex white, posterior edge brown-gray; thorax and fore wing light ocherous reddish, costal edge gray; a few blackish dots along inner margin, at tip of second lobe and in fissure; no spots; fringe gray. Hind wings dark gray. Expanse, 25 mm.

Two specimens, July 22 and 23. I have another specimen from Yosemite Valley, California, which issued from pupa July 23 (Dyar).

Type.—No. 6749, U. S. National Museum.

Pterophorus caudelli, n. sp.

Head white, olivaceous behind. Fore wing yellowish white, shaded, especially on the costal half with olivaceous gray, but the costal edge yellowish white; veins lined in brownish gray, distinctly so on the second lobe; fringe pale, grayer on anal angle of second lobe. Hind wing dark gray, fringe lighter, abdomen pale yellow; legs white, unmarked. Expanse, 24 mm.

One specimen, July 23.

Type.—No. 6750, U. S. National Museum.

Stenoptilia schwarzi, n. sp.

Head yellowish white; thorax white; abdomen with slight black dorsal dots at the ends of the three latter segments and a subdorsal line, emphasized at the ends of the segments. Fore wings grayish white, costal edge black; a diffuse grayish patch half way between base and fissure with an elongate one below and within it; a similar diffuse patch at base of fissure; a series of brown scales along costal edge predominate over both lobes, giving them a brown shade. Hind wings rather dark gray. Expanse, 32 mm.

One specimen, June 12.

Type.—No. 6748, U. S. National Museum.

5085. **Eucosma crambitana** Wals.

One specimen in very poor condition.

5092. **Eucosma agricolana** Wals.
5157. **Eucosma invicta** Wals.

Four examples, July 1, 7, and 16. All are a lttle smaller than Lord Walsingham's measurements, ♂ 26, ♀ 27–30 mm.; the head is white, not fawn brown, and there is no pink suffusion. But the description applies so well otherwise that I cannot think them specifically distinct.

Eucosma gilletteana, n. sp.

Allied to *bolanderana* Wals., but the wings more elongate and the markings likewise more drawn out and less serpentine. Also near *agassizii* Robs., but the serpentine streak is obliquely separated from the basal lanceolate portion.

Light brown, top of head, ends of patagia and center of thorax white. A lanceolate white streak at base of fore wing, not reaching middle; beyond it a serpentine bar not touching costa at basal third nor outer margin above anal angle, but almost doing so; a slightly oblique costal spot at outer third and an apical one slightly oblique in the reverse direction; a small, irregularly double spot on outer margin and fringe; a streak along interior margin, nearly divided at basal third. Hind wings grayish, fringe lighter. Expanse, 16–24 mm.

One ♂, June 16. I have also three other ♂♂ and one ♀ collected in Colorado by Prof. C. P. Gillette.

Type.—No. 6737, U. S. National Museum.

Eucosma (?) edemoidana, n. sp.

Resembles Lord Walsingham's figure of *Semasia bucephaloides*, but it is smaller, the head and thorax marked in yellow and brown.

Palpi ocherous brown; head light ocher, brown at the sides; thorax reddish brown, ocherous on the disk before. Fore wing gray, finely transversely lined in dark gray; a straight heavier line at basal third defines the darker basal portion, of which the costa at base is ocherous brown; middle of wing lighter, still crossed by the fine, strigose, transverse lines; beyond this the transverse lines are again heavier, edged by pale scales; terminal fourth of wing reddish and ocher, contrasting, narrowed toward internal margin, bordered basally by pale gray scales and crossed by a line of the same color with a few blackish scales centrally. A dark terminal line; fringe ocherous, mixed with gray. Hind wing blackish, fringe pale, interlined with gray. Expanse, 19 mm.

One ♀, July 19. I have another ♀ specimen from Las Vegas Hot Springs, New Mexico. (Schwarz and Barber.)

Type.—No. 6740, U. S. National Museum.

5201. **Thiodia obliterana** Wals.

Nine specimens, bred from larvæ in the roots of Artemisia. The specimens vary in the amount of ocherous shading on the costal half of wings. In some this is quite pronounced, in others fainter, but never absent as in Lord Walsingham's figure. Ap-

parently they agree with the specimens mentioned as received by him after the description had been drawn up. In the hind wings vein 4 is absent.

Thiodia stygiana, n. sp.

A large species without costal fold in the ♂, the outer margin very distinctly sinuate; hind wings with veins 3 and 4 stalked, 5 arising very near the base of the stalk.

Fore wings sordid russet brown, in some specimens shading to light gray on the costal edge, irrorate with brown; markings obsolete. The brown tends to lie in strigæ along the costa, and very faintly forms oblique lines on wing; it is darker and solid along internal margin. In the place of the ocelloid patch are scattering black scales or dots. Fringe pale, lustrous shining with a brown subbasal line. Hind wings and abdomen brown black, very dark, contrasted; anal tuft light brown; fringe as on fore wings. Expanse, 27–31 mm.

One ♂ from Williams, Arizona, and five other specimens from Colorado (Golden, May 29, June 9 and 19, Dyar and Caudell).

Type.—No. 6745, U. S. National Museum.

I should certainly have supposed this large and conspicuous species to have been described before, as it seems not rare in the eastern foothills of the Rocky Mountains, but I am unable to find a description applicable to it. It resembles Lord Walsingham's figures of *Pædisca irroratana*, *perdricana* and *fulminana*, but the four males before me show no sign of the costal fold.

I have a much paler specimen in which the gray occupies nearly all the wing and the black dots on ocelloid patch are distinct, from Easton, Washington (A. Koebele, through C. V. Riley), which suggests Zeller's figure of *T. rœssleri*, and my *stygiana* may prove to be a form of that species.

5210. **Proteopteryx emarginana** Wals.

One specimen like Lord Walsingham's figure 2.

5222. **Epinotia lagopana** Wals.

One fresh ♀ specimen, July 23.

Epinotia favillana, n. sp.

Male without costal fold, outer margin of fore wings not sinuate. Resembles somewhat Lord Walsingham's figure of *Pædisca carolinana*, but with differently disposed markings.

Fore wings white with a faint purplish tint, heavily marked with blackish brown. A broad, dark basal area with edge indented on costa, cell and submedian fold, mixed with white scales toward base; a broad median band from costa to internal margin, its edge nearly straight, with some black and leaden scales toward costa; costal edge with dark strigæ; terminal third of wing with white ground prevailing, the margin edged with brown black, broadest at apex; a large dark spot subterminally between veins 5 and 7, continued as a slightly oblique band to inner margin

and partly overlaid with white scales so as to appear gray; an obscure patch of leaden scales follows this spot in the apical dark band. Fringe dark. Hind wings gray. Expanse, 20 mm.

Three specimens, June, "bred from flower stalk." The name of the plant was not determined as only the dead and dried flower stalks were observed.

Epinotia (?) cornutana, n. sp.

Resembles *Enarmonia vitrana* Wals. Head pale fuscous. Body and wings brownish black, the outer part of fore wings with metallic bluish scales. A thick, geminate, oblique white bar on middle of internal margin, joins a similar one on dorsal margin, forming at the junction a beak-like projection of the black dorsal space. Beyond, four pairs of short, geminate, white costal streaks, the basal pair more oblique and remote than the others. The ocelloid patch consists of four dumbbell-shaped black bars on a grayish white ground, edged with scattered metallic scales. A white dash in the margin below veins 3 and 7 cuts the narrow black marginal line; fringe brown, shining. Expanse, 17 mm.

One female, July 22.

Type.—No. 6742, U. S. National Museum.

5320. **Acleris foliana** Wals.

5334. **Epagoge tunicana** Wals.

5365. **Archips argyrospila** Walk.

One female in very bad condition seems probably referable here.

5405. 1. **Tortrix semicirculana** Fern.

One specimen agreeing with Prof. Fernald's description. I have also five others taken at Las Vegas Hot Springs, New Mexico (Schwarz and Barber). It greatly resembles *quercifoliana* Fitch, but the more pronounced lines of the fore wings run in a reversed direction.

Tortrix dorsalana, n. sp.

Head and fore wings light straw color; an oblique band of fuscous brown from middle of costa to before anal angle, broken across the cell; a small spot on outer third of costa obscurely continued to anal angle by a somewhat curved streak; a spot on inner third of dorsal margin, extending upward in a few small strigæ. Markings all pulverulent or strigose, more or less reduced, especially on the costal portions so that in one specimen the only markings left are a large blotch before tornus and a small spot on the inner third of dorsal margin. Hind wings whitish, more or less tinged with gray. Expanse, 18–24 mm.

Four ♂♂, four ♀♀, three bred from oak, two from accidentally found pupæ, others taken June 30 and July 23.

Type.—No. 6736, U. S. National Museum.

5438. **Phalonia felix** Wals.

Two examples bred from larvæ in stem of Artemisia and another labelled "bred probably from oak," but I think this is a mistake. I have the species also from Las Vegas, New Mexico, May 5 and June 6 (T. D. A. Cockerell) and Wilgus, Cochise Co., Arizona (Dr. Barnes).

Phalonia unistrigana, n. sp.

Wings elongate and rounded, palpi short. Ground color white, overwashed on the fore wings irregularly with faint ocherous, the white remaining in patches in and below cell, on internal margin and in a transverse band at outer third of wing. A narrow, broken, oblique black-brown line, directed from middle of inner margin to outer third of costa, not reaching inner margin, broken centrally, the lower part forming a rounded bar, the upper part more diffuse; a series of diffuse, irregular, dark dots in apical portion, in some specimens confined to apical margin, in others spread as far as tornus and situated on white ground color. Hind wing dark gray, fringe paler except at anal angle. Expanse, 18–22 mm.

Three ♀♀, June 9. Also a male from Flagstaff, Arizona. (Schwarz and Barber.)

Type.—No. 6741, U. S. National Museum.

Besides the species listed above, there are eight other species of Pyralids, mostly Phycitinæ, and all but one females. Their position can therefore not be determined and they will have to await mates before being described. One of them is very strikingly marked.

The paper was discussed by Messrs. Howard and Ashmead. Mr. Ashmead mentioned a new and curious Mutillid collected by Messrs. Schwarz and Barber in Arizona. He said that special efforts should be made to collect wingless females of Mutillidæ in association with the males, as it was almost impossible to determine them when taken singly.

—The following paper by Mr. Caudell was read by the Recording Secretary:

NOTES ON THE NOMENCLATURE OF BLATTIDÆ.

By A. N. Caudell.

During the past year two attempts have been made to determine the type species of the Linnæan genus *Blatta*. In Entomological News, Volume xiii, page 101, Mr. James A. G. Rehn applied the process of elimination to the problem, only non-exotic species being considered in accordance with Canon xxiii of the

A. O. U. Code. He arrived at the conclusion that *Blatta orientalis* Linnæus is the type of the genus. But unfortunately the author gives in his table of elimination the date of the removal of *orientalis* from the genus *Blatta* as 1846, when in fact it was placed in the genus *Steleopyga* by Fischer in 1833,* and four years previous to that date into the genus *Kakerlac* by Latreille.† The only other non-exotic species, *lapponica*, was removed from *Blatta* to *Ectobius* by Westwood in 1835.‡ Thus, of the non-exotic species, *lapponica* was last removed and is, therefore, the type of *Blatta* as determined by the method of elimination when properly applied to the non-exotic species only.

Dr. Krauss, in his recent most valuable communication on the nomenclature of the Orthoptera,§ also applies the method of elimination, but, unlike Rehn, considers all the species originally included under the genus, both exotic and non-exotic. By this means he shows *surinamensis* to be the last removed, except *nivea*, which was simultaneously removed, both being included in Burmeister's genus *Panchlora*. Later, 1865,‖ Brunner removed *surinamensis* to his new subgenus *Leucophæa*. This, reasons Dr. Krauss, makes *Leucophæa* and *Blatta* synonymous, each having *surinamensis* as the type species.

Both of the above attempts at fixing the type of this genus, no matter how well done or how satisfactory the results may be to the respective authors, are, in the writer's opinion, wholly unnecessary and fruitless. As a matter of fact the type of *Blatta* was clearly designated many years ago. In 1807¶ Latreille included *orientalis* alone under the genus, and on this fact Dr. Krauss bases the statement that *orientalis* was described as typical at that date. But five years prior to that date** Latreille specified *orientalis* as the example (example here obviously used in the sense of type) of the genus *Blatta*. Then, in 1810†† the same author definitely designates *orientalis* as the type of *Blatta*, here using the word type. Now this author, writing as he did at a time before any of the original species had been removed from the genus, certainly had the right to designate which of them should constitute the generic type. A valid, non-exotic species, and one originally placed in the genus, having been specifically designated as the type, should never be changed, even by the one so designating it. Otherwise there can obviously never be a sta-

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* Bull. Soc. Nat. Mosc., vi, p. 366.

† Cuvier's Règne Animal, V (Ins. ii), p. 175. 1829.

‡ Stephen's Illustrations of British Entomology, Mandibulata, vi, p. 45.

§ Zoologischen Anzeiger, xxx, p. 530, Aug., 1902.

‖ Nouveau Système des Blattaires, p. 278.

¶ Genera Crustaceorum et Insectorum, iii, p. 83.

** Histoire Naturelle, iii, p. 269, 1802.

†† Consid. Crust. Arachn. et Insectes, p. 433.

ble nomenclature. Thus *orientalis* is the type of the genus *Blatta*.

Mr. D. W. Coquillett has recently called my attention to the fact that the dipterous genus *Phyllodromia* of Zetterstedt was described in 1837,* and not, as recorded by Agassiz and Scudder, in 1842. The orthopterous genus *Phyllodromia*, being thus preoccupied in the Diptera, must necessarily fall. Being a valid genus, of which *Blatta germanica* Linnæus is the type and having no synonyms, a new name is unavoidable. The generic name *Blattella* is here proposed for it.

Dr. Gill said that he upheld the conclusions Mr. Caudell had drawn in his paper.

Dr. Howard said that in his opinion there is a distinct ethical question involved in the proposal of new generic names to take the place of those preoccupied. While it is true that any one who makes the discovery of preoccupation has a right to propose a new name, and probably a moral right, he considers such action discourteous to the author if the author be still living and engaged in active work, and also discourteous to specialists in the group involved if the person making the change is not himself a specialist in the same group. As an example, he would not himself think of proposing a new name in the Lepidoptera unless he had previously notified the author of the name of the fact of preoccupation, and had indicated to him the desirability that he should himself propose a new name. Failing that, he would not propose a new name unless he had notified some other well-known worker in Lepidoptera of the preoccupation and had suggested that he propose a new name. In other words, in his opinion it is bad form for a man who is not a specialist in a group to propose a generic name in that group.

Mr. Ashmead agreed with Dr. Howard's views and spoke further in criticism of the extensive proposing of new specific names, as in Dalla Torre's Catalogue, in consequence of homonymy within the genus. He thought the uniting of so many genera not justified and that the new names would have to be rejected.

Dr. Dyar thought that personal considerations should not

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* Isis, p. 31.

enter into the question of scientific nomenclature. He thought that any one discovering a preoccupied name not only had a right to propose a new one, but it was his duty to do so, without waiting to see if he was trespassing on any one's preserves. He deprecated the practice of waiting for some one else to correct a homonym, for the chances were that this might not be done for a long time, and the error thus lost sight of and perpetuated. Provided the proposer of new names had enough knowledge of the group not to make matters worse by proposing a new name when there was an old synonym that could be resurrected, he thought such persons were conferring a favor on science and should not be discouraged by disparaging comment. In reply to Mr. Ashmead's remarks he pointed out that the changes in names in Dalla Torre's Catalogue were unavoidable and perfectly proper, after the several genera had been united, and that such a union of genera was well within the right of the cataloguer.

Dr. Gill said that his views coincided with those of Dr. Dyar, and Mr. Pollard stated that in proposing new names in botany the personal element was eliminated.

Mr. Busck has submitted the following paper for publication:

DIMORPHISM IN THE CODLING MOTH.

(*Cydia simpsonii*, n. var.)

By August Busck.

In his bulletin on the Codling moth,* Mr. C. B. Simpson mentions a moth "Found on the trunk of an apple tree that had all the appearance of a codling moth, except the color, which was buff and gold throughout, the bronze spot being much the same as in the codling moth. During the summer of 1901, 4 well-preserved and 8 badly worn specimens, having the same color, were bred among the common codling moth from apple, and 2 others were observed in the field. Mr. Hitt, of Weiser, Idaho, found 7 of these moths among 50 moths bred in 1896. Whether this is a variety of *Carpocapsa pomonella* or another species, has not yet been determined." [Simpson.]

During last summer, Mr. Simpson bred 6 more of these light-

* Bull. Div. Ent., U. S. Dept. Agric. (new series), No. 35, 1902, p. 14.

colored moths among 182 of the normal codling moth from apple, at Boise, Idaho. These specimens were submitted to the writer for determination, and I have carefully examined them structurally in comparison with the common form of *Cydia pomonella* Linné. I do not think there can be any doubt about their being this species; the oral parts, the venation, the secondary male sexual character of the hind wing and the external sexual organs of both sexes are identically as found in the common dark form of the codling moth. The general pattern of ornamentation is also the same, but the coloration is so strikingly different that the variety deserves a special name, the more so as no intermediate forms seem to occur. I propose that it be known as *Cydia pomonella* Linné, *var. simpsonii*.

Instead of the dark fuscous color of the common form, the variety is light buff with slightly darker buff transverse striation. In the common form the fore wings are finely irrorated with white, each scale being slightly white tipped; in *simpsonii* the scales are not white tipped. The terminal patch, which in the common form is dark coppery brown, nearly black, and with dark violaceous metallic streaks, is in *simpsonii* light fawn brown with pure golden metallic streaks. The extreme apical edge before the cilia is in the common form black, in the variety reddish brown, and the cilia in *simpsonii* are light golden ochreous instead of the dark fuscous of the common form. The head, palpi, body, legs, and the tuft of hairs on the hind wings of the male are correspondingly light buff-colored in the variety instead of dark fuscous as in the common form.

Besides Mr. Simpson's specimens, in which both sexes are equally represented, there is in the U. S. National Museum a single female labeled Cook, California, July 30, 1883.

Type.—No. 6803, U. S. National Museum.

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FRANK BENTON, Corresponding Secretary,

Department of Agriculture,

Washington, D. C.

—The three following papers were read by title:

NEUROPTEROID INSECTS FROM ARIZONA.

By NATHAN BANKS.

The following species of Neuropteroid insects were captured by Messrs. E. A. Schwarz and H. S. Barber in Arizona in 1901. I have included some taken by Mr. E. J. Oslar during the season of 1902, by Mr. H. G. Hubbard in the year 1897, by Messrs. Hubbard and Schwarz in 1898, by Mr. R. E. Kunze in 1897 and 1898, and a few by Cockerell and by Morse. The dragon-flies and ant-lion flies are not included. The total number is about 40 species; especially complete is the series of Chrysopidæ and Hemerobiidæ. The other groups are poorly represented.

Most of the species from Williams show close affinity to the Colorado fauna, but there are distinct indications of relation to the fauna of Southern California. A number of species are known to occur in Mexico, and one of these was not previously known from the United States. Two species have not been determined specifically.

The species most abundantly represented, and therefore probably the most common, are *Callibætis undata*, *Chrysopa californica*, *Eremochrysa punctinervis*, *Micromus variolosus*, and *Hemerobius perparvus*. These are typical southwestern species, none of them being known from the eastern States.

Order ARCHIPTERA.

Family PSOCIDÆ.

Psocus conspersus, n. sp.

Dark brown or nearly black, head dull; legs pale brownish; antennæ brown, pale at base. Wings hyaline; pterostigma brown, venation mostly brown, hind margin with two brown or black spots, one before the middle, the other close to the base; another spot near base of the closed cell in middle of wing; elsewhere the wing is sprinkled with minute dark dots, none, however, very close to the margin; hind wings unmarked, venation brown. Antennæ quite long and slender, front of head swollen. Wings moderately long; pterostigma rather large, rounded behind; the closed cell quadrangular, as wide at base as at the tip, nearly twice as long as broad.

Length, 3 mm.

A few specimens from Williams, July 24 and 27.

Type.—No. 6794, U. S. National Museum.

The National Museum also has specimens from Tucson, collected January 5 (Hubbard).

Psocus sp.

One specimen of a handsome species, related to *P. sparsus*, from Oracle, July 15 (Schwarz).

Family EPHEMERIDÆ.

Callibætis tessellata Hagen.

One specimen from Williams, July 16.

Callibætis undata Pictet.

Many specimens from Williams, June 16 to July 27. Common in Mexico.

Tricorythus explicatus Eaton.

Several specimens from Copper Basin, July 8 (Oslar). Previously known from Sonora and Vera Cruz, Mexico.

Callibætis sp.

One female from Catalina Springs, May 4 (Schwarz), appears to belong to another species.

Order NEUROPTERA.

Family SIALIDÆ.

Chauliodes filicornis, n. sp.

Dull black; vertex with some shining scars; antennæ pale yellowish brown, with black hair. Legs brownish, blacker toward tip; abdomen brownish, last segment black, above shining. Wings densely fimbriate with brown, more heavily at pterostigma, and a black band near base of wing from the radius back to the anal vein; a rather large brown spot between radial sector and median vein behind the pterostigma; venation brown, interrupted with whitish. Hind wings much less heavily marked, except in the costal region. Structure similar to *C. angusticollis* Hagen. Antennæ moniliform, long and slender, each joint with a circle of black hair around middle.

Length to tip of wings, 44 mm.

Type.—One male from Jerome, June 24 (Oslar), in the collection of the author.

Differs from *C. angusticollis* in color of head, markings of wings, shape of genitalia, and larger size.

There is a female in the National Museum collection from Pine Cañon, Chiricahua Mountains, collected by Mr. H. G. Hubbard on June 29.

Corydalis cognata Hagen.

Several specimens from Phœnix and Rio Verde (Oslar).

Previously known from New Mexico. There are also specimens in the National Museum from Phœnix, Ariz., collected by Mr. Kunze in April, May, June, July and August.

Family RAPHIDIIDÆ.

Raphidia assimilis Albarda.

Williams, May 26 to July 23; Catalina Springs, April 22 (Schwarz).

Occurs also in Colorado.

Raphidia minuta, n. sp.

Blackish, mandibles yellowish, basal joints of antennæ pale, anterior part of prothorax rather more reddish; legs pale yellowish; wings hyaline, pterostigma bicolored. Antennæ rather short and fine, prothorax narrowed in front and slightly constricted before the middle; its length scarcely more than the head. Ovipositor as long as abdomen; male genitalia very prominent and distinct. Wings with three cells beneath the pterostigma as in *R. bicolor*, and in other ways much like this species; only six cross-veins in costal region.

Length to tip of wings, 11–14 mm.

Specimens from Williams, June 10 (type) to July 17; Flagstaff, July 5; also from Las Vegas Hot Springs, New Mexico, August 6.

Type.—No. 6795, U. S. National Museum.

Family MANTISPIDÆ.

Mantispa sayi Banks.

One specimen, Williams, June 16; another, Hot Springs, June 28.

Previously known from Florida and Texas.

Symphasis signata Hagen.

Two specimens from Hot Springs, June 27. Also from Santa Rita Mountains, July 7 (Schwarz).

This is a distinctly southern form, occurring in southern California and in Mexico.

Family CHRYSOPIDÆ.

Eremochrysa punctinervis McLachlan.

Many specimens from Williams, May 29 to July 15; Oracle, July 5 (Schwarz); San Simon, July 6 (Hubbard); Winslow, July 31; Catalina Springs, April 18, May 9 (Schwarz).

A distinctly southern species, occurring from Texas to California.

Chrysopa schwarzi Banks.

One from Prescott, April 10 (Oslar).

The type is from New Mexico.

Chrysopa coloradensis Banks.

Williams, July 22 and 25.

Abundant in Colorado.

Chrysopa sabulosa Banks.

One from Prescott, April 7 (Oslar).

The type is from Colorado.

Chrysopa chlorophana Burmeister.

Bright Angel, July 12; Flagstaff, July 5; Prescott, April 4 (Oslar).

A species of the northern States.

Chrysopa arizonensis Banks.

Yuma (Morse). This is the type specimen.

Chrysopa externa Hagen.

Williams, July 28 and 29; Hot Springs, June 26; Flagstaff, July 6; Ft. Grant, July 16 (Hubbard).

Chrysopa californica Coquillett.

Williams, July; Winslow, July 31; Chiricahua Mountains, July 1 (Hubbard); Tucson, April 29 and July 20 (Schwarz); Prescott, June 26; Buckeye (Cockerell); Tempe, March 28 (Cockerell); Catalina Springs, May 9, and Santa Rita Mountains, June 8 and 14 (Schwarz).

Common in the West.

Chrysopa erythrocephala Banks.

One from Bright Angel, July 12.

A western species.

Chrysopa rufilabris Burmeister.

One from Williams, July 24.

An eastern species. This specimen does not appear to differ from typical examples.

Family HEMEROBIIDÆ.

Polystœchotes punctatus Drury.

From Williams, July 29 and 30; Salt River, April 17 (Oslar).

Distributed throughout the United States.

Megalomus latus, n. sp.

Head pale brown, antennæ rather paler; thorax darker brown, abdomen brown; legs yellowish. Wings hyaline, veins densely dotted with brown; around the margin dark spots alternate with pale; first gradate series marked with black, second curved and less distinct; a rather large blackish spot on the middle of hind margin. Hind wings hyaline, costal area and apical venation brown; also two brown spots on hind margin. Fore wings very broad, especially the costal area at base; five or six radial sectors, the first soon forked; veins very close together; first gradate series straight, oblique; second curved, following the outline of wing. Nearly all the costal veinlets before pterostigma are forked. In hind wings there are four branches of the radial sector; the costal cross-veinlets are very numerous.

Length of body, 8 mm.; expanse, 18 mm.

One specimen from Williams, July 24.

Type.—No. 6796, U. S. National Museum.

There are also specimens in the Barber & Schwarz collection from Las Vegas Hot Springs, New Mexico.

Berotha occidentalis Banks.

Two from Santa Rita Mountains, May 31, and Oracle, July 15 (Schwarz).

Occurs also in Nevada.

Micromus variolosus Hagen.

Many from Williams, May 30 to July 29; Hot Springs, June 26; Prescott, June 19; Flagstaff, July 2 to 5; Winslow, July 31; Santa Rita Mountains, June 18 (Schwarz); Chiricahua Mountains, June 9 (Hubbard).

Common in the West.

Hemerobius mœstus Banks.

One from Williams, July 29.

Also common in the West.

Hemerobius coloradensis Banks.

Several from Bright Angel, July 13; Williams, May 28 to 30.

Hemerobius pacificus Banks.

One from Williams, May 27.

Occurs also in Washington.

Hemerobius transversus Banks.

One from Williams, July 24.

Occurs also in Colorado.

Hemerobius schwarzi, n. sp.

Face shining black; vertex and antennæ pale yellowish; pronotum and rest of thorax pale, a black band across front of mesothorax, indistinct dark spots above on meso- and metathorax. Abdomen brownish; legs pale yellow. Wings very pale yellowish hyaline, the main veins lightly spotted with black, but the margin of wing unmarked. The first gradate series broken, the posterior part and the median part clouded with brown, so that each wing appears to have two brown spots near middle; in hind wings the veins all pale and unmarked. In fore wings the median is not bent toward cubitus, so that the basal cross-veins there are of sub-equal length. In the hind wings the first fork of the radial sector is as far out as the fork of median vein.

Length of body, 8 mm.; expanse, 19 mm.

One specimen from Williams, July 23.

Type.—No. 6797, U. S. National Museum.

It has also been taken at Mesilla, New Mexico.

Hemerobius barberi, n. sp.

Head pale yellowish; antennæ pale, marked with black near base and tip as in allied species; thorax pale, darker on sides; abdomen brownish; legs pale yellow. Wings pale; the fore wings finely and evenly irrorate with light brown, except the base is paler and there is a larger patch near middle of hind margin, and one in anal area. The venation is pale, with brown dots, and there are white spots along the margin. The hind wings are hyaline, with pale venation, except that around the margins is more brownish. The fore wings are rather long and narrow, longer than in allied species, and the costal area is broad at base; there are but two radial sectors.

Length of body, 3.5 mm.; expanse, 11 mm.

Two specimens from Williams, July 20 and 21.

Type.—No. 6798, U. S. National Museum.

A specimen from Los Angeles, California, appears to be the same species.

Hemerobius perparvus McLachlan.

Several examples from Williams, May 28; Bright Angel, July 12 to 17; Oracle, July 9 (Schwarz).

This species is common from Texas to California.

Hemerobius umbratus, n. sp.

Dark shining brown; abdomen rather paler brown; antennæ and legs pale yellow. Fore wings uniformly dark brown; hind wings nearly hyaline, except the brown costal streak; all venation brown, unmarked. In structure similar to *H. occidentalis* Fitch; the first sector of radius connected to lower fork of the second sector, the first sector not being forked till near tip of wing. The costal area is quite broad at base.

Length of body, 3.5 mm.; expanse, 10 mm.

One specimen from Williams, June 10.

Type.—No. 6799, U. S. National Museum.

Readily distinguished from all other species by the uniform dark colored fore wings. I have what is probably the same species from New Mexico, but the specimen is not in good condition.

Family CONIOPTERYGIDÆ.

Coniopteryx sp.

Specimens from Willliams, May 29; Ashfork, June 18.

Order TRICHOPTERA.

Family SERICOSTOMATIDÆ.

Helicopsyche sp.

One specimen from Santa Rita Mountains, June 15 (Schwarz).

Probably new, but closely related to *H. californica*.

Family LEPTOCERIDÆ.

Leptocella minuta Banks.

Two from Hot Springs, August 21, appear to be identical with the type from Pullman, Washington.

Family RHYACOPHILIDÆ.

Chimarrha angustipennis, n. sp.

Black; legs pale, spines dark; wings fumose, with black venation. Very similar in structure to *Ch. aterrima*, but both pairs of wings are narrower than in that species; the closed discal cell is plainly shorter and the forks are longer than in that species. Otherwise the species are very close to each other.

Length, 5 mm.; expanse, 11 mm.

Several specimens from Hot Springs, June 21 and 22.

Type.—No. 6800, U. S. National Museum.

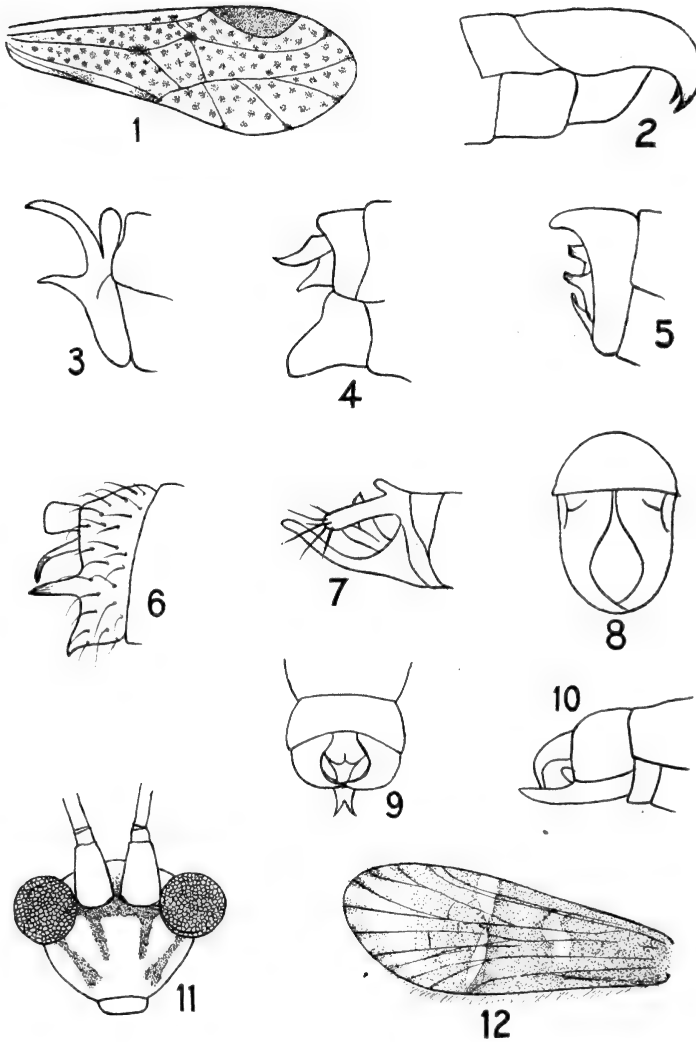

PLATE IV.

Family HYDROPSYCHIDÆ.

Polycentropus, sp.

Four specimens from Santa Rita Mountains, May and June (Schwarz).

It is probably a new species.

Hydropsyche divisa, n. sp.

Head black; face with silvery hair; vertex with erect black hair; behind with white hair; antennæ brown, ringed with white; thorax black, with appressed white hair in the middle; abdomen brown; legs pale yellowish, darker above at tips of tibiæ, and the tarsi often marked with brown; spurs yellow. Wings brown, marked with some small white patches; just before the pterostigma is a white band extending back to the median vein, broadest on the costa; and from the arculus there extends forward a narrow curved white band, nearly touching the other one, so that the wing is nearly divided by a white band beyond the middle. Sometimes there are indications of another white band half way from this one to the base. Beyond the band the wing is paler than before, with more pale hairs. The fringe around the tip is blackish at tips of veins and yellowish between. Hind wings are fumose, with blackish fringe and venation.

Structure similar to other small species; the hind tibiæ are sparsely fringed on the posterior side.

Length, 7 mm.

Several specimens from Salt river, April 10 (Oslar).

Type.—In the author's collection.

Family LIMNEPHILIDÆ.

Anabolina, n. gen.

A Limnephilid; peculiar in that the female has but three spurs on the hind tibiæ, while the male has four; a condition unknown so far in this family. Three spurs on middle tibiæ. Anterior wings rather slender, lightly rounded at tip; in hind wings the fourth apical cell is narrow at base, the fifth quite broad; the discal cell rather longer than apicals. In fore wing the discal cell is very long; the pterostigma is quite distinct, and the radial vein is bent close by. Ocelli moderately large; two transverse warts on vertex; basal joint of antennæ rather short; prothorax extremely short; anterior tarsi of male not elongated.

Type: A. diversa Banks.

In the present condition of the classification of the Limnephilidæ this must be a separate genus; but the spur formula is not a sure criterion and I hope it may soon be displaced by some better character, drawn perhaps from the chætotaxy of the head and thorax.

Anabolina diversa, n. sp.

Face pale, with golden hair, and black bristles on the sides; vertex brownish, with some short white hairs, a few black bristles behind each

antenna and a wart on each side of vertex bearing a row of black bristles. Thorax with a broad white stripe in middle, dark brown on the sides; pleuræ yellowish; abdomen brown above, paler beneath. Antennæ pale yellowish brown; legs rather paler, with many black spines; spurs yellowish. Wings hyaline, with gray hairs; venation pale, irregularly marked with brown, the cubitus and anal more heavily marked; pterostigma rather distinct. Hind wings gray hyaline, venation brownish, a brown dot in base of third apical cell; fringe short and brown in both pairs.

Length, 16 mm.

Several specimens, Prescott, June 19 to 25 (Oslar).

Type.—In the author's collection.

EXPLANATION OF PLATE IV.

1. *Psocus conspersus*, wing.
2. *Hemerobius schwarzi*, male appendages.
3. *Hemerobius cockerelli*, male appendages (inverted).
4. *Hemerobius perparvus*, male appendages.
5. *Anabolina diversa*, male appendages.
6. *Hemerobius umbratus*, male appendages.
7. *Raphidia minuta*, male appendages.
8. *Hemerobius pacificus*, male appendages.
9. *Chauliodes filicornis*, appendages, top view.
10. *Chauliodes filicornis*, appendages, side view.
11. *Chrysopa schwarzi*, head.
12. *Hydropsyche divisa*, wing.

THE GENERA OF THE DIPTEROUS FAMILY EMPIDIDÆ, WITH NOTES AND NEW SPECIES.

By D. W. COQUILLETT.

The present paper is an attempt to settle the type species of each North American and European genus of Empididæ, and to bring some kind of system out of the present confused condition into which the genera of this family have fallen. Our own fauna is so similar to that of Europe that our students cannot well afford to ignore the latter when working with specimens from this country. Of the generic names adopted in the synoptic table given in my Revision of the North American Empidæ, comparatively few changes are necessary: thus *Hemerodromia* includes more than one genus, and this is also true of *Tachydromia; Mantipeza* gives way to *Chelifera*, a much older name; *Rhamphomyia* gives place to the much earlier *Macrostomus*, as *Sciodromia* does to the earlier *Heleodromia; Syneches* is replaced by the much earlier *Acromyia*, as *Cyrtoma* is by the earlier *Bicellaria*.

In regard to the earliest date of each genus, the rule has been

adopted that the name dates from its earliest appearance in print if accompanied by a description or by the name of a described species; on the other hand, when both the name of the genus and of the species listed under it are simply manuscript names, it is evident that as yet the genus can have no standing.

HISTORICAL.

In the following list all generic names are given in regular alphabetical order, valid genera in bold-faced type, synonyms in italics.

Acromyia Latreille, Gen. Crust. Ins., IV, 305, 1809. (*Syneches* Walker, 1852; *Pterospilus* Rondani, 1856.)
Type: *Asilus muscarius* Fabricius.

Latreille placed *Acromyia* Bonelli (evidently a MS. name) as a synonym of *Hybos* Meigen, gave a brief description of the genus, and mentioned *Acromyia asiliformis* Bonelli, *Stomoxys asiliformis* Fabricius (=*Asilus muscarius* Fabricius, according to Meigen,* repeated by Schiner†).

Anthalia Zetterstedt, Ins. Lappon., 538, 1838.
Type: *Anthalia gyllenhali* Zetterstedt.

Zetterstedt described three species as new, the first, *A. gyllenhali*.

Anthepiscopus Becker, Wiener Ent. Zeit., X, 281, November 30, 1891.
Type: *Anthepiscopus ribesii* Becker.

Becker described two species as new and figured the first, *A. ribesii*.

Ardoptera Macquart, Ins. Dipt. Nord France, Separata, 106, 1827. (= Dolichocephala *Macquart*, 1823.)
Type: *Tachydromia irrorata* Fallen.

Work not seen by the writer, but Macquart later‡ mentions only one species in this genus, *Tachydromia irrorata* Fallen.

Bergenstammia Mik, Verh. k. k. Ges. Wien 1881, 326, 1882.
Type: *Clinocera nudipes* Loew.

Mik mentioned only one species, *Clinocera nudipes* Loew.

Bicellaria Macquart, Recueil Trav. Soc. Sci. Agr. Arts Lille, 155, 1823. (*Cyrtoma* Meigen, 1824.)
Type: *Empis spuria* Fallen.

Macquart described one species as new, *B. nigra* (= *Empis spuria* Fallen).

Blepharoprocta Loew, Berl. Ent. Zeitsch., VI, 194, May, 1862.
Type: *Brachystoma nigrimana* Loew.

Loew mentioned three species, the first, *Brachystoma nigrimana* Loew.

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* Syst. Besch., II, 349.
† Faun. Aus., Dipt., I, 77.
‡ Hist. Nat. Dipt., I, 358, 1834.

Boreodromia Coquillett, new genus.
Type: *Synamphotera bicolor* Loew.

Brachystoma Meigen, Syst. Besch., III, 12, 1822.
Type: *Syrphus vesiculosus* Fabricius.

Meigen described two species, *B. longicornis*, new species, and *Syrphus vesiculosus* Fabricius. Westwood* designated *longicornis* as the type, but referred to the figure of *vesiculosus* as a typical figure. Rondani† selected *longicornis* as the type of his new genus *Trichopeza*, and designated *vesiculosus* as the type of *Brachystoma*.

Chamädipsia Mik, Verh. k. k. Ges. Wien 1881, 326, 1882.
Type: *Clinocera hastata* Mik.

Mik mentioned only one species, *Clinocera hastata* Mik.

Chelifera Macquart, Recueil Trav. Soc. Sci. Agr. Arts Lille, 150, 1823. (*Mantipeza* Rondani, 1856; *Polydromya* Bigot, 1857.)
Type: *Tachydromia præcatoria* Fallen.

Macquart described one species as new, *C. raptor*, but on page 165 he states that it is identical with *Hemerodromia monostigma* Meigen (= *Tachydromia præcatoria* Fallen, according to Schiner,‡ and Loew§).

Chelipoda Macquart, Recueil Trav. Soc. Sci. Agr. Arts Lille, 148, 1823. (*Lepidomya* Bigot, 1857.)
Type: *Empis melanocephala* Fabricius.

Macquart described two species, *Tachydromia mantispa* Panzer (an erroneous identification, as the species is credited with a discal cell), and *C. minor*, new species, but on page 165 he states that the latter is identical with *Hemerodromia mantispa* Meigen (= *Tachydromia mantispa* Panzer = *Empis melanocephala* Fabricius, according to Meigen,‖ and Schiner¶).

Chersodromia Walker, List Dipt. Ins. Brit. Mus., IV, 1157, 1849.
Type: *Tachypeza arenaria* Haliday.

Walker, without describing this genus, referred to *Tachypeza arenaria* Haliday and *Tachydromia graminum* Fallen. Rondani** designated as the type *Tachypeza brevipennis* Zetterstedt (= *Tachypeza arenaria* Haliday, according to Walker†† and Schiner‡‡).

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* Introd., II, Synop., 132, 1840.
† Dipt. Ital. Prod., I, 150, 1856.
‡ Fauna Aus., Dipt., I, 83.
§ Wiener Ent. Monat., VIII, 238.
‖ Syst. Besch., III, 64.
¶ Faun. Aus., Dipt., I, 86.
** Dipt. Ital. Prod., I, 147, 1856.
†† Ins. Brit., Dipt., I, 138.
‡‡ Fauna Aus., Dipt., I, 96.

Chyromantis Rondani, Dipt. Ital. Prod., I, 148, 1856. (= Phyllodromia *Zetterstedt*, 1837.)

Type: *Tachydromia vocatoria* Fallen.

Rondani designated the above species as the type.

Clinocera Meigen, Illiger's Mag., II, 271, 1803. (*Paramesia* Macquart, 1835.)

Type: *Clinocera nigra* Meigen.

Meigen mentioned no species. Rondani* designated the above species as the type.

Coloboneura Melander, Trans. Am. Ent. Soc., XXVIII, 229, Nov., 1902.

Type: *Coloboneura inusitata* Melander.

Described only the above species.

Crossopalpus Bigot, Ann. Soc. Ent. France, 557, 1857. (= Tachydromia *Meigen*, 1803.)

Type: *Platypalpus ambiguus* Macquart.

Bigot mentioned only the above species.

Cyrtoma Meigen, Syst. Besch., IV, 1, 1824. (= Bicellaria *Macquart*, 1823.)

Type: *Empis spuria* Fallen.

Meigen described three species, the first, *C. atra* (an arbitrary change of name of *Empis spuria* Fallen), was designated as the type by Westwood.†

Dolichocephala Macquart, Recueil Trav. Soc. Sci. Agr. Arts Lille, 147, 1823. (*Ardoptera* Macquart, 1827; *Leptosceles* Haliday, 1833.)

Type: *Tachydromia irrorata* Fallen.

Macquart described one species as new, *D. maculata*, but on page 165 he stated that it is identical with *Hemerodromia irrorata* Meigen (=*Tachydromia irrorata* Fallen).

Drapetis Meigen, Syst. Besch., III, 91, 1822.

Type: *Drapetis exilis* Meigen.

Described one species as new, *D. exilis*.

Dryodromya Rondani, Dipt. Ital. Prod., I, 150, 1856. (= Hilara *Meigen*, 1822.

Type: *Empis tenella* Fallen.

Rondani designated as the type *Dryodromya testacea*, new species (evidently founded on a specimen of *Empis tenella* Fallen with a supernumerary cross-vein in the second submarginal cell). Mik‡ wrongly refers this genus as a synonym of *Tachydromia*, apparently overlooking the fact that Rondani placed it in the section in which the third vein is forked.

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* Dipt. Ital. Prod., I, 149, 1856.
† Introd., II, Synop., 133, 1840.
‡ Ent. Nachrichten, XII, 324, 1886.

Dysaletria Loew, Zeitsch. Ent. Breslau, XIV, 7, 1860. (= Platypalpus *Macquart*, 1827.

Type: *Tachypeza atriceps* Boheman.

Loew described one species, *Tachypeza melanocephala*, which he credited to Boheman, but it is evident from his references as well as from his description that the name *melanocephala* is an error for *atriceps*. This has already been pointed out by Röder.*

Elaphropeza Macquart, Ins. Dipt. Nord France, Separata, 86, 1827.

Type: *Tachydromia ephippiata* Fallen.

Work not seen by the writer, but Macquart later† mentions only one species in this genus, *Tachydromia ephippiata* Fallen.

Empimorpha Coquillett, Proc. U. S. Nat. Mus., XVIII, 396, June, 1896.

Type: *Empimorpha comantis* Coquillett.

Designated the above species as the type.

Empis Linné, Syst. Natur., Ed. 10, 603, 1758. (*Platypterygia* Stephens, 1829; *Eriogaster* Macquart, 1838; *Enoplempis* Bigot, 1880; *Steleocheta* Becker, 1887.)

Type: *Empis pennipes* Linné.

Linné described three species as new, *E. borealis*, *pennipes* and *livida*. Latreille‡ designated as the type *Empis pennipes* Fabricius (= Linné).

Enicopteryx Stephens, Syst. Cat. Brit. Ins., 264, 1829. (= Macrostomus *Wiedemann*, 1817.)

Type: *Rhamphomyia infuscata* Meigen.

Stephens listed three species, *Empis fusca* (a manuscript name), *Rhamphomyia infuscata* Meigen, and *hyalinipennis*, new species (with *Rhamphomyia anomalipennis* Meigen as its synonym). Westwood§ designated *Rhamphomyia infuscata* Meigen as the type.

Enoplempis Bigot, Ann. Soc. Ent. France, Bull., XLVII, 1880 (= Empis *Linné*, 1758).

Type: *Enoplempis mira* Bigot.

Bigot described only one species as new, *E. mira*.

Eriogaster Macquart, Dipt. Exot., I, Part 2, 162, 1838; not of Germar, 1811. (= Empis *Linné*, 1758.)

Type: *Empis laniventris* Eschscholtz.

Macquart designated the above species as the type of this genus.

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* Wiener Ent. Zeit., III, 291, Dec. 15, 1884.

† Hist. Nat. Dipt., I, 359, 1834.

‡ Consid. Gen., 443, 1810.

§ Introd., II, Synop., 131, 1840.

Eucelidia Mik, Verh. k. k. Ges. Wien 1881, 326, 1882.
Type: *Empis zetterstedti* Fallen.

Mik mentioned *Brachystoma escheri* Zetterstedt, *Empis zetterstedti* Fallen and *Clinocera pirata* Mik, figuring a wing and femur of the second species.

Euhybus Coquillett, Proc. U. S. Nat. Mus., XVIII, 437, June, 1896.
Type: *Hybos purpureus* Walker.

Mentioned three species, *Hybos subjectus* Walker, *H. purpureus* Walker, and *H. triplex* Walker.

Euthyneura Macquart, Ann. Soc. Ent. France, 517, 1836.
Type: *Euthyneura myrtilli* Macquart.

Described only the above species.

Gloma Meigen, Syst. Besch., III, 14, 1822.
Type: *Gloma fuscipennis* Meigen.

Described only the above species.

Heleodromia Haliday, Entom. Mag., I, 159, 1833. (*Microcera* Zetterstedt, 1838; *Sciodromia* Haliday, 1840.)
Type: *Heleodromia immaculata* Haliday.

Haliday described four species as new, *H. immaculata, bipunctata, stagnalis* and *fontinalis.* Curtis* designated *immaculata* as the type, and this was repeated by Macquart,† who placed *bipunctata* and *stagnalis* in his new genus *Hydrodromia.*

Hemerodromia Meigen, Syst. Besch., III, 61, 1822. (*Microdromya* Bigot, 1857.)
Type: *Tachydromia oratoria* Fallen.

Meigen described nine species, the fifth, *Tachydromia mantispa* Panzer, was designated as the type by Westwood,‡ but this species had previously been placed by Macquart in his new genus *Chelipoda.* Rondani§ designated as the type *Tachydromia oratoria* Fallen, the third species described by Meigen.

Hilara Meigen, Syst. Besch., III, 1, 1822. (*Dryodromya* Rondani, 1856.)
Type: *Empis maura* Fabricius.

Meigen described twenty-one species, the second of which, *Empis maura* Fabricius, was designated as the type by Curtis.||

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* Brit. Entom., 519, 1834.
† Hist. Nat. Dipt., II, 658, 1835.
‡ Introd., II, Synop., 132, 1840.
§ Dipt. Ital. Prod., I, 148, 1856.
|| Brit. Entom., 130, 1826.

Holoclera Schiner, Wiener Ent. Monat., IV, 53, February, 1860.

Type: *Holoclera pulchra* Egger.

Schiner designated as the type the above species which at that time was evidently undescribed.

Hormopeza Zetterstedt, Ins. Lappon., 540, 1838.

Type: *Hormopeza obliterata* Zetterstedt.

The above was the only species mentioned.

Hybos Meigen, Illiger's Mag., II, 269, 1803. (*Lactistomyia* Melander, 1902.)

Type: *Musca grossipes* Linné.

Meigen mentioned no species. Curtis* designated as the type *Hybos funebris* Fabricius (= *Musca grossipes* Linné, according to Walker,† repeated by Schiner).‡

Hydrodromia Macquart, Hist. Nat. Dipt., II, 658, 1835.

Type: *Heleodromia stagnalis* Haliday.

Macquart described two species, *Heleodromia bipunctata* Haliday and *H. stagnalis* Haliday. Mik§ transferred *H. bipunctata* to his new genus *Kowarzia*.

Iteaphila Zetterstedt, Ins. Lappon., 540, 1838.

Type: *Iteaphila macquarti* Zetterstedt.

The above was the only species mentioned.

Kowarzia Mik, Verh. k. k. Ges. Wien 1881, 325, 1882.

Type: *Clinocera barbatula* Mik.

Mentioned four species and figured a wing and the head of the first one, *Clinocera barbatula* Mik.

Lactistomyia Melander, Trans. Am. Ent. Soc., XXVIII, 250, Nov., 1902. (= Hybos *Meigen*, 1803.)

Type: *Lactistomyia insolita* Melander.

Described one species as new, *L. insolita*, from Brazil. The characters on which this genus was founded are the thickened and tuberculate hind femora of the male, but in the males of one species in the related genus *Euhybus* these characters are present but are wanting in the females, as well as in both sexes of closely related species. The characters therefore are not only confined to one sex but are plainly not of generic importance.

Lamposoma Becker, Berl. Ent. Zeitsch., XXXIII, 338, 1889.

Type: *Lamposoma cavaticum* Becker.

The above was the only species mentioned.

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* Brit. Entom., 661, 1837.
† Ins. Brit. Dipt., I, 120
‡ Faun. Aus., Dipt., I, 78.
§ Verh. k. k. Ges. Wien 1881, 325, 1882.

Lamprempis Wheeler and Melander, Biol. C.-Am., Dipt., I, 366, Dec., 1901.

Type: *Empis chichimeca* Wheeler and Melander.

Placed this as a subgenus of *Empis* and gave a synoptic table of six species, the fourth, *Empis chichimeca*, new species.

Lepidomya Bigot, Ann. Soc. Ent. France, 557, 1857. (= Chelipoda *Macquart*, 1823.)

Type: *Empis melanocephala* Fabricius.

Bigot mentioned only one species, *Hemerodromia mantispa* Meigen (= *Empis melanocephala* Fabricius, according to Meigen,* repeated by Schiner).†

Leptopeza Macquart, Ins. Dipt. Nord France, Separata, 143, 1827.

Type: *Ocydromia flavipes* Meigen.

Work not seen by the writer, but Macquart later‡ placed in this genus only one species, *Leptopeza flavipes* Macquart (= *Ocydromia flavipes* Meigen).

Leptosceles Haliday, Entom. Mag., I, 160, 1833. (= Dolichocephala *Macquart*, 1823.)

Type: *Leptosceles guttata* Haliday.

Haliday described three species, the first, *L. guttata*, new species.

Litanomyia Melander, Trans. Am. Ent. Soc., XXVIII, 231, Nov., 1902. (= Phyllodromia *Zetterstedt*, 1837.)

Type: *Sciodromia mexicana* Wheeler and Melander.

Melander described two species and figured the first, *Sciodromia mexicana* Wheeler and Melander.

Macroptera Becker, Wiener Ent. Zeit., VIII, 80, Feb. 28, 1889; not of Lioy, 1863. (= Symballophthalmus *Becker*, 1889.)

Type: *Macroptera pictipes* Becker.

The above was the only species mentioned by Becker.

Macrostomus Wiedemann, Zool. Mag., I, Part 1, 60, 1817. (*Rhamphomyia* Meigen, 1822; *Enicopteryx* Stephens, 1829; *Rhamphomyza* Zetterstedt, 1838; *Megacyttarus* Bigot, 1880.)

Type: *Hybos ferrugineus* Fabricius.

Wiedemann mentioned only the above species, from South America, and later states§ that this genus is identical with *Rhamphomyia*.

Mantipeza Rondani, Dipt. Ital. Prod., I, 148, 1856. (= Chelifera *Macquart*, 1823.)

Type: *Tachydromia præcatoria* Fallen.

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* Syst. Besch., III, 64.

† Faun. Aus., Dipt., I, 86.

‡ Hist. Nat. Dipt., I, 321, 1834.

§ Aus. Zweif. Ins., II, 10, 1830.

Rondani designated as the type *Hemerodromia monostigma* Hoffmannsegg (= Meigen). This is given as a synonym of *Tachydromia præcatoria* Fallen by Schiner* and by Loew.†

Megacyttarus Bigot, Ann. Soc. Ent. France. Bull., XLVII, 1880. (= Macrostomus *Wiedemann*, 1817.)
Type: *Rhamphomyia limbata* Loew.

Bigot described one species as new, *M. argenteus*; this is identical with *Rhamphomyia limbata* Loew according to Coquillett.‡

Meghyperus Loew, Stett. Ent. Zeit., XI, 303, Sept., 1850.
Type: *Meghyperus sudeticus* Loew.

The above was the only species mentioned.

Metachela Coquillett, new genus.
Type: *Hemerodromia collusor* Melander.

Microcera Zetterstedt, Ins. Lappon., 572, 1838; not of Meigen, 1803, nor of Mannerheim, 1830. (= Heleodromia *Haliday*, 1833.)
Type: *Heleodromia immaculata* Haliday.

Zetterstedt described one species as new, *M. rostrata*, identical with *Heleodromia immaculata* Haliday according to Walker,§ and repeated by Schiner.‖

Microcyrta Bigot, Ann. Soc. Ent. France, 557, 1857. (= Platytelma *Rondani*, 1856.)
Type: *Cyrtoma pallipes* Meigen.

The above is the only species referred to by Bigot.

Microdromya Bigot, Ann. Soc. Ent. France, 557, 1857. (= Hemerodromia *Meigen*, 1822.
Type: *Tachydromia oratoria* Fallen.

Bigot mentioned no species, but the characters he gave must, in all probability, have been drawn from the above species.

Microphorus Macquart, Ins. Dipt. Nord France, Separata, 14, 1827.
Type: *Microphorus velutinus* Macquart.

Work not seen by the writer. Rondani¶ designated as the type *Microphorus velutinus* Macquart, the second species described by Macquart.

Mythicomyia Coquillett, Ent. News, 208, June, 1893.
Type: *Mythicomyia rileyi* Coquillett.

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* Faun. Aus., Dipt., I, 83.
† Wiener Ent. Monat., VIII, 238.
‡ Proc U. S. Nat. Mus., XVIII, 388, June, 1896.
§ Ins. Brit., Dipt., I, 107.
‖ Faun. Aus., Dipt., I, 86.
¶ Dipt. Ital. Prod., I, 151, 1856.

The above was the only species mentioned.

Neocota Coquillett, Proc. U. S. Nat. Mus., XVIII, 434, June, 1896.
Type: *Neocota weedi* Coquillett.

The above species was designated as the type.

Neoplasta Coquillett, Proc. U. S. Nat. Mus., XVIII, 392, June, 1896.
Type: *Hemerodromia scapularis* Loew.

Coquillett designated the above species as the type.

Ocydromia Meigen, Syst. Besch., II, 351, 1820.
Type: *Empis glabricula* Fallen.

Meigen described five species, the first, *Empis glabricula* Fallen, was designated the type by Westwood.*

Œdalea Meigen, Syst. Besch., II, 355, 1820. (*Xiphidicera* Macquart, 1834.)
Type: *Empis hybotina* Fallen.

Meigen described two species, *Empis hybotina* Fallen and *E. minuta* Fallen; the latter was selected in 1834 by Macquart as the type of his new genus *Xiphidicera*, leaving *hybotina* as the type of *Œdalea*, and it was so designated by Westwood.†

Oreogeton Schiner, Wiener Ent. Monat., IV, 53, Feb., 1860.
Type: *Gloma basalis* Loew.

The above species was designated as the type.

Oreothalia Melander, Trans. Am. Ent. Soc., XXVIII, 232, Nov., 1902.
Type: *Oreothalia pelops* Melander.

The above was the only species mentioned.

Pachymeria Stephens, System. Catal., 262, 1829. (*Pachymerina* Macquart, 1834.)
Type: *Empis femorata* Fabricius.

Stephens listed two species, *Empis ruralis* Meigen and *aprica*, new species; the latter is a manuscript name, while the former is identical with *Empis femorata* Fabricius, according to Schiner.‡

Pachymerina Macquart, Hist. Nat. Dipt., I, 333, 1834. (= Pachymeria *Stephens*, 1829.)
Type: *Empis femorata* Fabricius.

Macquart described four species and figured the first, *Empis femorata* Fabricius.

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* Introd., II, Synop., 133, 1840.
† Introd., II, Synop., 133, 1840.
‡ Faun. Aus., Dipt., I, 110.

Pachypeza Lioy, Atti Ins. Ven., 723, 1864; not of Serville, 1835. (= Platytelma *Rondani*, 1856.)
Type: *Cyrtoma pallipes* Meigen.

Lioy mentioned only the above species.

Paramesia Macquart, Hist. Nat. Dipt., II, 656, 1835; not of Stephens, 1829. (= Clinocera *Meigen*, 1803.)
Type: *Paramesia wesmaelii* Macquart.

Macquart described two species as new and figured the first, *P. wesmaelii*.

Parathalassius Mik, Wiener Ent. Zeit., x, 217, July 31, 1891.
Type: *Parathalassius blasigii* Mik.

The above was the only species mentioned.

Phäobalia Mik, Verh. k. k. Ges. Wien 1881, 326, 1882.
Type: *Clinocera trinotata* Mik.

Mentioned four species, the first, *Clinocera trinotata* Mik.

Philolutra Mik, Verh. k. k. Ges. Wien 1881, 327, 1882. (= Röderia *Mik*, 1882.)
Type: *Clinocera phantasma* Mik.

Mentioned eight species, the first, *Clinocera phantasma* Mik. The difference in the acrostichal bristles, which extend across the mesonotum in one so-called genus and are confined to the anterior portion in the other, cannot be considered of generic value, especially in view of the fact that a very closely related species from Italy has no acrostichals whatever.

Phoneutisca Loew, Berl. Ent. Zeitsch., VII, 19, June, 1863.
Type: *Phoneutisca bimaculata* Loew.

The above was the only species mentioned.

Phoroxypha Rondani, Dipt. Ital. Prod., I, 146, 1856.
Type: *Tachydromia longicornis* Meigen.

The above species was designated as the type.

Phyllodromia Zetterstedt, Isis von Oken, 31, 1837. (*Chyromantis* Rondani, 1856; *Thamnodromia* Mik, 1886; *Litanomyia* Melander, 1902.)
Type: *Tachydromia vocatoria* Fallen.

Zetterstedt briefly described this as a section of *Hemerodromia*, and listed three described and two manuscript species; of the former, Macquart had in 1823 selected the first and fourth species for two of his new genera, leaving only one of the described species, *Tachydromia vocatoria* Fallen, the second species listed by Zetterstedt.

Platypalpus Macquart, Ins. Dipt. Nord France, Separata, 194, 1827. (*Dysaletria* Loew, 1860.)
Type: *Musca cursitans* Fabricius.

Work not seen by the writer. Westwood* designated as the type *Musca cursitans* Fabricius, the nineteenth species described in a later work by Macquart.†

Platyptera Meigen, Illiger's Mag., II, 269, 1803.
Type: *Empis platyptera* Panzer.

Meigen mentioned two species, *Empis borealis* Fabricius (= Linné) and *E. platyptera* Panzer; the first species belongs to the previously erected genus *Empis*.

Platypterygia Stephens, System. Catal., 263, 1829. (=Empis *Linné*, 1758.)
Type: *Empis borealis* Linné.

Stephens listed only the above species.

Platytelma Rondani, Dipt. Ital. Prod., I, 138, 1856. (*Microcyrta* Bigot, 1857; *Pachypeza* Lioy, 1864.)
Type: *Cyrtoma pallipes* Meigen.

Rondani designated the above species as the type.

Polydromya Bigot, Ann. Soc. Ent. France, 557, 1857. (= Chelifera *Macquart*, 1823.)
Type: *Tachydromia præcatoria* Fallen.

Bigot mentioned no species, but the characters given accord well with the imperfect figure by Meigen‡ intended to represent *Tachydromia præcatoria* Fallen.

Pterospilus Rondani, Dipt. Ital. Prod., I, 152, 1856. (= Acromyia *Latreille*, 1809.)
Type: *Asilus muscarius* Fabricius.

Rondani designated as the type the above species under the generic name of *Hybos*.

Ragas Walker, Entom. Mag., IV, 229, 1837. (*Synamphotera* Loew, 1858.)
Type: *Ragas unica* Walker.

Walker mentioned only the above species.

Rhamphomyia Meigen, Syst. Besch., III, 42, 1822. (=Macrostomus *Wiedemann*, 1817.)
Type: *Empis sulcata* Fallen.

Meigen described 37 species, the ninth, *Rhamphomyia sulcata* Meigen (=*Empis sulcata* Fallen) was designated as the type by Curtis.§

Rhamphomyza Zetterstedt, Ins. Lappon., 562, 1838. (=Macrostomus *Wiedemann*, 1817.)

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* Introd., II, Synop., 132, 1840.
† Hist. Nat. Dipt., I, 355, 1834.
‡ Syst. Besch., III, pl. 23, fig. 13.
§ Brit. Entom., 517, 1834.

Type: *Empis sulcata* Fallen.

Arbitrary change in spelling *Rhamphomyia;* the twelfth species that Zetterstedt described is *Empis sulcata* Fallen.

Röderia Mik, Verh. k. k. Ges. Wien 1881, 326, 1882. (*Philolutra* Mik, 1882.)
Type: *Clinocera longipennis* Mik.

The above was the only species mentioned.

Roederiodes Coquillett, Aquat. Ins. Adiron., 585, Sept., 1901.
Type: *Roederiodes juncta* Coquillett.

The above was the only species mentioned.

Sciodromia Haliday, in Westwood's Introd., II, Synop., 132, 1840. (=Heleodromia *Haliday*, 1833.)
Type: *Heleodromia immaculata* Haliday.

The above species was designated as the type.

Sicus Latreille, Precis, 158, 1796; not of Scopoli, 1763. (=Tachydromia *Meigen*, 1803.
Type: *Musca cimicoides* Fabricius.

Latreille mentioned no species, but in a later work* he designated the above species the type.

Steleocheta Becker, Berl. Ent. Zeitsch., XXXI, 129, Aug., 1887. (=Empis *Linné*, 1758.)
Type: *Steleocheta setacea* Becker.

The above was the only species mentioned.

Stilpon Loew, Neue Beitr., VI, 34, 1859.
Type: *Tachydromia graminum* Fallen.

Loew mentioned two species, the first, *Tachydromia graminum* Fallen.

Symballophthalmus Becker, Wiener Ent. Zeit., VIII, 285, Oct. 5, 1889. (*Macroptera* Becker, 1889; not of Lioy, 1863.)
Type: *Macroptera pictipes* Becker.

Change of name for *Macroptera* Becker, preoccupied.

Synamphotera Loew, Zeitsch. Ges. Naturw., XI, 455, 1858. (= Ragas *Walker*, 1837.)
Type: *Synamphotera pallida* Loew.

The above was the only species mentioned.

Syndyas Loew, Ofvers. Kon. Vet.-Akad. Forh., XIV, 369, Oct. 14, 1857.
Type: *Syndyas opaca* Loew.

Described two species as new (from Caffraria, Africa), the first, *S. opaca*.

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*Consid. General., 443, 1810.

Syneches Walker, Ins. Saund., I, 165, 1852. (= Acromyia *Latreille*, 1809.)
Type: *Syneches simplex* Walker.
The above was the only species mentioned by Walker.

Tachista Loew, Zeitsch. Ent. Breslau, XIV, 7, 1860. (= Tachydromia *Meigen*, 1803.)
Type: *Tachydromia connexa* Meigen.
Loew described eleven species, the sixth being *Tachydromia connexa* Meigen.

Tachydromia Meigen, Illiger's Mag., II, 269, 1803. (*Sicus* Latreille, 1796, not of Scopoli, 1763; *Crossopalpus* Bigot, 1857; *Tachista* Loew, 1860.)
Type: *Tachydromia connexa* Meigen.
Meigen mentioned two species, *Musca cursitans* Fabricius and *Musca cimicoides* Fabricius; the first belongs to the subsequently erected genus *Platypalpus*, while the second was an erroneous identification to which Meigen afterward gave the name of *T. connexa*.*

Tachypeza Meigen, Syst. Besch., VI, 341, 1830.
Type: *Tachydromia nubila* Meigen.
Meigen referred to ten species. Rondani† designated as the type the eighth species, *Tachydromia nervosa* Meigen, identical with the earlier *T. nubila* Meigen, according to Loew.‡

Thamnodromia Mik, Wiener Ent. Zeit., V, 278, Oct. 12, 1886. (= Phyllodromia *Zetterstedt*, 1837.)
Type: *Tachydromia vocatoria* Fallen.
Change of name for *Phyllodromia* Zetterstedt under the erroneous impression that the latter is preoccupied by *Phyllodromia* Serville, 1839.

Trichina Meigen, Syst. Besch., VI, 335, 1830.
Type: *Trichina clavipes* Meigen.
Described two species as new. Rondani§ designated as the type the second species, *T. clavipes*.

Trichopeza Rondani, Dipt. Ital. Prod., I, 150, 1856.
Type: *Brachystoma longicornis* Meigen.
Rondani designated the above species as the type.

Wiedemannia Zetterstedt, Ins. Lappon., 559, 1838.
Type: *Heleodromia bistigma* Curtis.
Zetterstedt described two species, the first, *W. borealis* "Zett., It. Lappon., 1832, 207" (evidently up to that time a manuscript name), is identi-

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* Syst. Besch., III, 70, 1822.
† Dipt. Ital. Prod., I, 147, 1856.
‡ Zeitsch. Ent. Breslau, XIV, 12.
§ Dipt. Ital. Prod., I, 152, 1856.

cal with *Heleodromia bistigma* Curtis, according to Walker,* repeated by Schiner.† (*Wiedemannia* Meigen, 1838, is placed as a synonym of *Mintho* Desvoidy, 1830, by Schiner,‡ and in this he is followed by Brauer and Bergenstamm.)§

Xiphidicera Macquart, Hist. Nat. Dipt., 1, 356, 1834. (= Œdalea *Meigen*, 1820.)

Type: *Empis minuta* Fallen.

Macquart described one species as new, *X. rufipes*, which is identical with *Empis minuta* Fallen, according to Schiner.‖

TABLE OF THE GENERA.

1\. Third vein forked 35
Third vein simple 2

2\. Anal cell closed far from the wing-margin, at least a portion of the cross vein at its apex or of the sixth vein, always present 3
Anal cell wholly united with the axillary cell, sixth vein wholly wanting, discal cell always united with one of the other cells 29
Anal cell open to the wing-margin, second vein terminating in the first, three veins issuing from apex of the discal cell, *Mythicomyia* Coq.

3\. Discal cell complete 4
Discal cell united with one of the other cells 23

4\. Second posterior cell sessile 5
Second posterior cell long-petiolate, proboscis very short, *Meghyperus* Loew.

5\. With three veins issuing from apex of the discal cell 11
With only two veins issuing from apex of this cell 6

6\. Lower outer angle of anal cell acute, this cell at least as long as the second basal 8
Lower outer angle of anal cell obtuse, this cell shorter than the second basal 7

7\. Arista apical, third joint of antennæ conical .... *Leptopeza* Macq.
Arista subdorsal, third joint of antennæ oval .... *Ocydromia* Meig.

8 Origin of second vein midway between the small and the humeral crossveins, or nearer to the former. 9
Origin nearer to the humeral than to the small crossvein, *Acromyia* Latr.

9\. Vein between basal cells distinct 10
Vein between these cells obsolete .... *Syndyas* Loew.

10\. Eyes widely separated below the antennæ, proboscis elongated, *Hybos* Meig.
Eyes contiguous below the antennæ, proboscis short .... *Euhybus* Coq.

* Ins. Brit., Dipt , 1, 107.
† Faun Aus., Dipt., 1, 84.
‡ Faun. Aus., Dipt., 1. 556.
§ Zweifl. Kais. Mus. Wien, v, 426.
‖ Faun. Aus., Dipt., 1, 81.

11. Front femora not noticeably thickened.. 12
Front femora considerably thickened, third antennal joint oval, the arista elongated..*Phyllodromia* Zett.

12. Third joint of antennæ elongated and rather narrow, at least twice as long as wide, usually longer than the thickened style.................. 15
Third joint oval, the arista elongated and bristle-like, femora not thickened.. 13
Third joint short and wide, at most one and three-fourths times as long as wide, the apical portion sometimes prolonged styliform, *Anthalia* Zett.

13. Proboscis much shorter than height of head.................................. 14
Proboscis as long as height of head, axillary angle of wings only slightly projecting..*Heleodromia* Hal.

14. Antennæ as long as the arista, axillary angle distinctly projecting, *Parathalassius* Mik.
Antennæ only half as long as the arista, axillary angle only slightly projecting..*Oreothalia* Mel.

15. Axillary angle strongly projecting.. 16
Axillary angle not projecting, anal cell much shorter than the second basal, its lower outer angle rounded, the crossvein at its apex only slightly oblique, proboscis slightly longer than height of head, directed downward (type, *Synamphotera bicolor* Loew, *Boreodromia*, n. gen.

16. Height of head less than length of proboscis................................... 19
Height of head greater than length of proboscis................................ 17

17. Hind femora not thickened.. 18
Hind femora considerably thickened, spinose on the under side, *Œdalea* Meig.

18. Stigma contiguous to apex of second vein, sixth vein prolonged to the wing-margin...*Trichina* Meig.
Stigma contiguous to apex of first vein, or obsolete; sixth vein obliterated beyond apex of anal cell ....*Microphorus* Macq.

19. Direction of proboscis forward... 20
Direction of proboscis downward... 21

20. Base of discal cell pointed, stigma at apex of first vein, arista minute, *Anthepiscopus* Beck.
Base of discal cell pointed, arista rather long..........*Holoclera* Schin.
Base of discal cell truncated, stigma at apex of second vein, *Euthyneura* Macq.

21. Wings of female (male unknown) unusually broad, three-fourths as broad as long, subtruncated at the apex..............*Platyptera* Meig.
Wings not unusually broad, the apex rounded................................... 22

22. Face bare ....*Macrostomus* Wied.
Face hairy...*Neocota* Coq.

23. Fourth vein forked, the base of the upper branch sometimes obliterated.. 28
Fourth vein simple 24

24. Femora of front legs thickened, those of middle legs spinose on the under side 26
Femora not thickened, those of middle legs not spinose 25
25. Anal cell only reaching middle of the second basal cell, *Symballophthalmus* Beck.
Anal cell nearly reaching apex of the second basal... *Platytelma* Rond.
26. Sixth vein present, sometimes indistinct 27
Sixth vein wholly wanting, second basal cell longer than the first, third joint of antennæ short-oval .... *Tachypeza* Meig.
27. Last antennal joint oval, shorter than the artista... *Platypalpus* Macq.
Last joint elongated, longer than the artista......... *Phoroxypha* Rond.
28. Front femora thickened, axillary angle of wings not projecting, *Chelipoda* Macq.
Front femora slender, axillary angle of wings strongly projecting, *Bicellaria* Macq.
29. Antennal arista apical 31
Antennal arista dorsal or subapical 30
30. Palpi narrow, as long as the proboscis, second vein near its apex bent forward at nearly a right angle.. .... *Phoneutisca* Loew.
Palpi broad, front of an equal width .... *Stilpon* Loew.
31. First pair of femora thickened 32
First pair of femora not thickened 33
32. Eyes contiguous or nearly so below the antennæ, hind tibiæ bearing at most two or three bristles .... *Tachydromia* Meig.
Eyes widely separated below the antennæ, hind tibiæ bearing many bristles .... *Coloboneura* Mel.
33. Third joint of antennæ short-oval 34
Third joint elongated .... *Elaphropeza* Macq.
34. Second basal cell equal to or shorter than the first, *Chersodromia* Walk.
Second basal cell longer than the first .... *Drapetis* Meig.
35. Anal cell present 36
Anal cell wholly united with the axillary, discal cell united with one of the others, fourth vein forked .... *Hemerodromia* Meig.
36 Second posteria cell long-petiolate 62
Second cell sessile or nearly so 37
37. Discal cell separated from the second basal 38
Discal cell united to the second basal .... *Neoplasta* Coq.
38. Arista much longer than the third antennal joint 39
Arista at most as long as the third antennal joint, the latter usually elongated 55
39. Axillary angle strongly projecting 52
Axillary angle not or only slightly projecting 40
40. Last joint of antennæ short-oval, proboscis shorter than height of head 41
Last joint narrow and greatly elongated, proboscis as long as height of head, directed downward .... *Trichopeza* Rond.

41. Veins two and three sinuous, wings grayish, marked with hyaline dots ....*Dolichocephala* Macq.
Veins not sinuous, wings never marked in this manner....................42
42. Face bare 43
Face hairy, the sides separated by a groove from the narrow cheeks, hind crossvein very angular, lower inner corner of third posterior cell acute..*Kowarzia* Mik.
43. Body usually opaque, under side of middle and hind femora at most with a preapical bristle.. 44
Body polished, middle or hind femora usually bearing several bristles on the under side......................................*Brachystoma* Meig.
44. Hind crossvein nearly straight and perpendicular, lower inner angle of third posterior cell almost rectangular, sides of face separated by grooves from the very narrow cheeks 45
Hind crossvein very angular, or very oblique, lower inner angle of third posterior cell acute 47
45. Pulvilli and empodia well developed, scutellum bare except the marginal pair of bristles 46
Pulvilli and empodia rudimentary, scutellum bearing more than a pair of marginal bristles...................................*Bergenstammia* Mik.
46. Stigma wanting...*Hydrodromia* Macq.
Stigma distinct..*Phäobalia* Mik.
47. Empodia and pulvilli well developed 48
Empodia and pulvilli rudimentary, sides of face separated by grooves from the narrow cheeks, scutellum bare except for the pair of marginal bristles..*Lamposoma* Beck.
48. Wings having the narrow stigma situated nearer to first vein than to apex of second, or wanting 49
Wings having the rounded stigma situated nearer to apex of second vein than to the first, scutellum bearing several short bristles besides the long marginal pair, sides of face not separated by grooves from the broad cheeks...*Wiedemannia* Zett.
49. Femora without preapical bristles.. 50
Femora with a pair of such bristles, scutellum bearing short bristles besides the marginal pair, sides of face not separated by grooves from the broad cheeks..*Eucelidia* Mik.
50. Sides of face not separated by grooves from the broad cheeks....... 51
Sides of face separated by grooves from the narrow cheeks, scutellum bearing a marginal pair of bristles, otherwise bare. *Clinocera* Meig.
51. Scutellum bearing a pair of marginal bristles, otherwise bare, short bristles in the dorsocentral rows on the thorax...*Chamädipsia* Mik.
Scutellum bearing short bristles in addition to the marginal pair, *Röderia* Mik.
52. Arista slender, bristle-like... 53
Arista thick, style-like, proboscis thick, horizontal, anal cell shorter than the second basal...*Oreogeton* Schin.

53. Crossvein at apex of anal cell nearly perpendicular to the hind margin of the wing 54
Crossvein nearly parallel with hind margin of wing, proboscis thick, nearly as long as height of head, almost perpendicular, *Gloma* Meig.

54. Anterior branch of third vein terminating in the costa, *Brachystoma* Meig.
Anterior branch terminating in the second vein, *Blepharoprocta* Loew.

55. Upper side of body never metallic 56
Upper side of body metallic green, brassy, or bluish, *Lamprempis* W. & M.

56. Proboscis at most as long as height of head 57
Proboscis longer than height of head, crossvein at apex of anal cell parallel with hind margin of the wing 59

57. Axillary angle strongly projecting 58
Axillary angle only slightly projecting, crossvein at apex of anal cell nearly perpendicular to the hind margin of the wing .. *Ragas* Walk.

58. Antennæ three-jointed, the third joint conical, arista rather long, *Hilara* Meig.
Antennæ very short, apparently two-jointed, the third joint oval, arista and proboscis very short .... *Hormopeza* Zett.

59. Direction of proboscis downward 60
Direction of proboscis forward, arista very short .... *Iteaphila* Zett.

60. Face bare 61
Face hairy .... *Empimorpha* Coq.

61. Hind legs not longer than the others, hind femora much thickened, eyes separated .... *Pachymeria* Steph.
Hind legs longer than the others, hind femora not or only slightly thickened .... *Empis* Linn.

62. Front femora thickened 63
Front femora slender .... *Roederiodes* Coq.

63. Discal cell united with one of the other cells (type, *Hemerodromia collusor* Melander) .... *Metachela*, n. gen.
Discal cell separate, distinct .... *Chelifera* Macq.

NOTES.

Microphorus flavipilosus Coq., *M. crocatus* Coq., and *M. ravidus* Coq., all belong to *Microphorus*, as originally referred, while *M. atratus* Coq. belongs more properly to *Anthalia*.

The genera *Holoclera* and *Euthyneura* do not occur in this country, so far as I am aware. *Holoclera bilineata* Melander belongs to *Microphorus*, while *H. sycophantor* Melander belongs to *Anthalia*. *Euthyneura aperta* Melander, *E. stentor* Melander, and *E. atripes* Melander, are all referable to *Microphorus;* while *E. nura* Melander and *E. bulbosa* Melander

belong to *Anthalia*. *Euthyneura bucinator* Melander was founded on a single specimen without antennæ, and its generic position cannot be given.

Sciodromia palliata Coquillett belongs to *Microphorus*.

Empis conjuncta Coquillett has more affinity with typical species of *Empis* than with those of any other genus; from *Ragas* it differs widely, especially in the strongly projecting axillary angle, in the venation, mouth parts, etc.

Hilara viridis Coq. belongs to the subsequently erected genus *Lamprempis*, as suspected by Prof. T. D. A. Cockerell in a recent letter to the writer.

Synamphotera bicolor Loew is given above as the type of the new genus *Boreomyia*.

Our species originally described under the old genera *Hemerodromia* and *Mantipeza* may be listed as follows:

Chelifera: *albipes* Walker, *notata* Loew, *obsoleta* Loew, *palloris* Coquillett and *valida* Loew.

Hemerodromia: *captus* Coquillett, *defessa* Williston, *empiformis* Say, *rogatoris* Coquillett and *superstitiosa* Say.

Neoplasta: *mexicana* Melander and *scapularis* Loew.

Metachela: *collusor* Melander and *defecta* Loew.

Hydrodromia stagnalis Haliday has been recorded from Greenland by Lundbeck.*

I am unable at present to assign to their proper genera our species described under the old genera *Hybos* and *Clinocera*, owing to the insufficiency of the descriptions and the lack of specimens.

Wheeler and Melander† state that *Hybos triplex* Walker, *H. purpureus* Walker, *H. duplex* Walker, and *H. subjectus* Walker comprise only one species, and this is repeated by Mr. Melander.‡ When preparing my Revision of the Empidæ I constructed the following table, but omitted its publication. While the names assigned to the species may not be correct in every instance, owing to Walker's superficial descriptions, yet every conscientious student must admit that there are three valid species:

1. Hind tarsi of male bearing a row of stout black spines on the outer side of the first joint, femora without tubercles, *Euhybus subjectus* Walk.

   Hind tarsi without black spines 2

2. Hind femora of male bearing on the outer third of the under side several elongated tubercles, each tipped with a short spine, the greatly curved hind tibiæ with a corresponding cavity, *E. purpureus* Walk.

   Hind legs without tubercles and cavities .... *E. triplex* Walk.

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*Vid. Meddel. Natur. Kjobenhavn, 297, 1898.

† Biol. C.-Am.. Dipt , I, 373.

‡ Trans. Am. Ent. Soc., XXVIII, 248.

In my Revision of the Empidæ, page 397, attention was called to the fact that *Enoplempis cinerea* Bigot belongs to the genus *Empis*, and that as the name *Empis cinerea* is preoccupied, Bigot's insufficient description had better be cancelled. Mr. Melander, however,* takes the opposite course, and proposes the name *Empis bigoti* for the above species, thus adding another synonym to our already long list, since what is almost certainly the same species was described by the writer in his Revision, under the name of *Empis manca*, new species. The giving of new names to very imperfectly described species will hardly commend itself to students except in case that a more perfect description is added from the type or other authentic specimen.

Mr. Melander's statement† that my original description of *Empis pellucida* depends on that of *E. virgata* is erroneous, as any student can ascertain by turning to that description.‡ The latter is complete in itself, and contains no reference to the description of *virgata*, or any other species.

Platypalpus trivialis Loew has wholly yellow femora and tibiæ in both sexes; the U. S. National Museum possesses a series of specimens of both sexes from each of the following localities: White Mountains, New Hampshire; Beverly, Massachusetts; Las Vegas Hot Springs, New Mexico, and Colorado.

Tachydromia inusta Melander, *T. corticalis* Melander and *T. brachialis* Melander belong to *Tachypeza*. On the other hand, *Tachypeza pusilla* Loew belongs to *Tachydromia*. *Tachypeza clavipes* Loew, *T. rapax* Loew, *T. rostrata* Loew and *T. winthemi* Zetterstedt, all belong to *Tachypeza*, as originally referred. *Tachypeza rapax* Loew is evidently a synonym of *Sicus fenestratus* Say; I know of no other species in this group which has the front coxæ marked with black, as mentioned by Say, a character peculiar to the male, the female having the front coxæ and femora unspotted, and closely resembling *rostrata*, from which it may easily be distinguished by the yellow hind tibiæ with only their apices brown or black.

Drapetis medetera Melander belongs to *Elaphropeza*, as is evident from the greatly elongated third antennal joint. *Drapetis flavida* Williston belongs to *Tachydromia*, as already stated in my paper on the Diptera of Porto Rico;§ not only are the front femora considerably thickened, but those of the male bear several spinous bristles on the under side.

Tachydromia nubifera Coquillett belongs to the recently erected genus *Coloboneura*.

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* Trans. Am. Ent. Soc., XXVIII, p. 319.
† Trans. Am. Ent. Soc., XXVIII, p. 313.
‡ Proc. Wash. Acad. Sci., II, p. 408.
§ Proc. U. S. Nat. Mus., XXII, 251, May 12, 1900.

Phoneutisca bimaculata Loew is evidently a synonym of *Tachydromia maculipennis* Walker; both were founded on specimens from the far North, and no other known species in this group has the wings marked "with a large brown spot on the fore border at two-thirds of the length from the base," as described by Walker.

DESCRIPTIONS OF NEW SPECIES.

Tachydromia varipennis, n. sp.

Near *schwarzi*, but the two brown cross-bands on each wing broadly united along the costa. Head black front polished, only slightly narrowed anteriorly, antennæ yellowish brown, about one-third as long as the arista, the third joint short-oval, eyes contiguous below the antennæ, palpi whitish, a black bristle at apex of each, proboscis black; body black, polished, the front edge of pleura whitish pruinose, scutellum bearing two bristles; legs yellowish, the tibiæ, hind femora, and apices of tarsi brownish, legs without bristles, no spurs at apices of middle tibiæ; halteres whitish; wings smoky brown, the base as far as base of second vein, the apex nearly as far as apex of this vein, and a half-band extending from apex of fifth vein to the third vein, whitish hyaline; marginal cell at apex of first vein scarcely half as wide as the submarginal at the same point, apex of third vein nearly three times as far from apex of the second as from that of the fourth, small crossvein nearly three-fourths of the length of the second basal cell. Length, 2 mm.

A specimen of each sex, collected at Franconia, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6774, U. S. National Museum.

Tachydromia lata, n. sp.

A very broad, robust form, the mesonotum broader than long. Head black, front subopaque, strongly narrowed anteriorly, antennæ brown, one-third as long as the arista, the third joint short-oval, eyes contiguous for a short distance on the face, palpi yellow, a black bristle at apex of each, proboscis black; body black, with a strong brassy tinge, polished, mesonotum covered with depressed yellow hairs, scutellum bearing two long and a few short bristles; legs brown, the front coxæ, both ends of their femora, their tibiæ, and bases of their tarsi yellow; sometimes the yellow coloring is much more extended; a preapical bristle on front side of each femur, a long preapical bristle on inner side of each front and middle tibia and three short bristles at apex of front side of each hind tibia; halteres yellow; wings hyaline, marginal cell at apex of first vein as wide as the submarginal at the same point, apex of third vein nearly twice as far from apex of the second as from that of the fourth, small crossvein near middle of second basal cell. Length, 2 mm.

Two specimens, apparently males, collected at Lake Worth and Biscayne Bay, Florida, by Mrs. Annie T. Slosson.

Type.—No. 6775, U. S. National Museum.

Coloboneura nana, n. sp.

Black, the legs and halteres yellow; front opaque, considerably narrowed anteriorly, antennæ slightly over half as long as the arista, the third joint oval and with a short prolongation at its apex, eyes widely separated on the face; thorax opaque, gray pruinose; femora with a short preapical bristle on the front side. middle and hind tibiæ bearing several rather long bristles; wings hyaline, marginal cell at apex of first vein slightly wider than the submarginal at the same point, apex of third vein nearly three times as far from apex of the second as from that of the fourth, second basal cell slightly shorter than the first. Length, 1 mm.

Four male specimens, collected at Lake Worth, Florida, by Mrs. Annie T. Slosson.

Type.—No. 6776, U. S. National Museum.

Tachypeza pruinosa, n. sp.

Near *rostrata*, but the mesonotum more densely pruinose, that on the front end and sides bluish gray, encroaching considerably on the upper part of the propleura and mesopleura. Head black, front only slightly narrowed anteriorly, eyes widely separated above the antennæ, contiguous for a considerable distance over the face, antennæ reddish yellow, about one-fourth as long as the style, the third joint oval, palpi yellow, proboscis reddish yellow; body black; legs brown, the coxæ, front and middle tarsi except the last joint, also base of hind tarsi and ends of hind femora narrowly, yellow, first two pairs of femora more yellowish brown, their tibiæ with a yellow vitta on the outer side; front femora greatly thickened, without spinules on the under side, middle femora slightly thickened, the under side with minute spinules and with a rather long hair at the base, inner side of first two pairs of tibiæ and under side of first joint of their tarsi bearing many spinules, middle tibiæ without apical spurs; halteres yellow; wings grayish hyaline, submarginal cell above small crossvein slightly wider than the marginal at the same point, apex of third vein nearly twice as far from apex of second as from that of the fourth, small crossvein oblique, about its length before apex of second basal cell, crossvein at apex of this cell perpendicular. Length, 3.5 mm.

A female specimen collected at Atherton, Missouri, April 30, by Mr. C. F. Adams.

Type.—No. 6777, U. S. National Museum.

Œdalea pruinosa, n. sp.

Head black, front and face polished, antennæ dark brown, the third joint four times as long as wide, gradually tapering toward the apex, about eight times as long as the style, proboscis black, the labella yellowish; thorax black, somewhat opaque, thinly grayish pruinose, a polished streak above the middle coxæ, scutellum bearing four bristles; abdomen brownish yellow; legs, including the coxæ, yellow, the apical portion of the hind tibiæ brownish, tarsi toward their apices brown; wings

hyaline, stigma obsolete, anterior intercalary vein obliterated before reaching the wing margin, last section of fifth vein slightly over half as long as the preceding section; halteres yellow. Length, 2.5 mm.

A female specimen collected at Franconia, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6778, U. S. National Museum.

Anthalia stigmalis, n. sp.

Near *bulbosa*, but with a dark brown stigma. Black; third joint of antennæ broadly oval, only slightly longer than broad, about four times as long as the style; proboscis slender, projecting forward about length of the third antennal joint beyond the oral margin, slightly longer than the palpi; eyes contiguous on the front; body somewhat polished; wings hyaline, venation complete, veins and stigma dark brown. Length, 1.5 mm.

Two males collected at Port Renfrew, British Columbia, received from Prof. J. S. Hine.

Type.—No. 6780, U. S. National Museum.

Anthalia flava, n. sp.

Head and its members brown, the lower part of occiput and the front sometimes yellowish, third joint of antennæ short-oval, only slightly longer than wide, about four times as long as the style, proboscis about one-fourth as long as height of head; body, halteres and legs yellow, apices of tarsi brown, thorax somewhat polished, the hairs and bristles black; wings hyaline, veins yellow, stigma obsolete, venation complete last section of fifth vein slightly longer than the preceding section. Length, 1 mm.

One male and nine females collected on Mt. Washington, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6779, U. S. National Museum.

Microphorus gilvihirtus, n. sp.

Differs from *Anthalia flava* as follows: Head and first two joints of antennæ yellow, third joint of antennæ elongate-oval, slightly over twice as long as wide, the style minute, hairs and bristles of thorax yellow, last section of the fifth vein nearly twice as long as the preceding section. Length, slightly over 1 mm.

A female specimen collected at Franconia, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6781, U. S. National Museum.

Microphorus obscurus, n. sp.

Black; eyes contiguous on the front, third joint of antennæ elongate-conical, slightly widening near the base and then tapering gradually to the apex, three and one-half times as long as broad, nearly twice as long as the style, proboscis slender, directed forward, projecting the length of third antennal joint beyond the oral margin, palpi only slightly project-

ing; mesonotum opaque, velvety, its hairs and bristles black, hairs of abdomen yellowish: hind tibiæ without long hairs, distinctly dilated, as are also the first two joints of their tarsi; wings hyaline, veins brown, stigma pale brown, last two sections of the fifth vein subequal. Length, 1.5 mm.

A male specimen collected at Franconia, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6782, U. S. National Museum.

Empis exilis, n. sp.

Head black, eyes contiguous, the upper facets not larger than the lower, face somewhat polished, proboscis yellow, slightly longer than height of head; antennæ brown, the third joint very elongate-lanceolate, about five times as long as the style; body slender, black, a large yellow spot on each side of the first four abdominal segments, venter yellow, body polished, except a cordate, gray pruinose spot in front of the scutellum, hairs of body pale, bristles of mesonotum and scutellum black, scutellum bearing two bristles, hypopygium small, the central filament arcuate, exposed except at the apex; legs, including the coxæ, yellow, the apical portion of the first two pairs of tarsi, whole of the hind ones, apical fourth of the hind tibiæ and outer half of the hind femora except at the apex, brown; hind femora considerably thickened, the under side beset with black, spinous bristles, middle and hind tibiæ bearing a few rather short bristles on the outer side, front and middle metatarsi subequal in size, about one-third as thick as the hind ones; wings hyaline, stigma obsolete, last section of fifth vein slightly longer than the preceding, sixth vein prolonged almost to the wing-margin; halteres yellowish. Length, 3.5 mm.

A male specimen collected at Atherton, Missouri, May 11, by Mr. C. F. Adams.

Type.—No. 6783, U. S. National Museum.

Empis scoparia, n. sp.

Head black, eyes widely separated, facets of a uniform size, front and face polished, antennæ brown, the third joint lanceolate, about four times as long as wide, six times as long as the style; proboscis yellowish brown, one and one-half times as long as height of head; body black, polished, the margin of mesonotum, whole of pleura, scutellum and metanotum, opaque, gray pruinose, hairs of abdomen and those in front of the halteres mixed brown and yellowish, scutellum bearing four bristles, hypopygium large, central filament exposed at the apex, in front of the hypopygium on the venter is a large prominence tipped with a large cluster of rather short black bristles; coxæ black, legs dark yellow, the tarsi except their bases brown, femora slender, under side of the last two pairs beset with rather short bristles, the outer side of the tibiæ bearing a few bristles, hind metatarsi slightly thicker than the others; wings hyaline, stigma gray, venation complete, sixth vein prolonged to the wing margin; halteres yellow. Length, 6 mm.

A male specimen collected at Franconia, N. H., by Mrs. Annie T. Slosson.

Type.—No. 6784, U. S. National Museum.

Empis brunnea, n. sp.

Black, the legs dark brown, the halteres yellowish brown, eyes contiguous, the upper facets distinctly larger than the lower ones, third joint of antennæ elongate-lanceolate, about four times as long as wide, slightly over twice as long as the style, proboscis somewhat longer than height of head; body subopaque, thinly grayish pruinose, hairs in front of the halteres brown, scutellum bearing four bristles, hypopygium very small, central filament short, very robust, exposed except at the apex; legs slender, almost bare, the hind tibiæ with a few rather long bristly hairs on the outer side, hind metatarsi nearly three times as thick as the others; wings hyaline, stigma brown, venation complete, sixth vein prolonged to the wing-margin, but the subterminal portion faint. Length, 3 mm.

Three males collected by the writer in Los Angeles Co., California, in February.

Type.—No. 6785, U. S. National Museum.

Empis hirtipes, n. sp.

Black; eyes contiguous, upper facets larger than the lower ones, third joint of antennæ elongate-lanceolate, about four times as long as wide, twice as long as the style, proboscis more than twice as long as height of head; body opaque, gray pruinose, hairs in front of the halteres black, scutellum bearing two bristles, hypopygium small, the filament hidden except at the base; legs rather slender, tarsi considerably thickened, the front and middle ones slightly thicker than the hind ones, all tarsi and the middle and hind tibiæ bearing many long hairs, wanting on the inner side of the hind tibiæ; wings smoky hyaline, brown along the costa, fourth vein obliterated before reaching the wing-margin, the sixth prolonged to this margin, first posterior cell slightly wider than the first submarginal. Length, 4 mm.

A male specimen collected July 19 by Mr. C. H. T. Townsend, at Rio Ruidosa, White Mountains, New Mexico (altitude about 6500 feet).

Type.—No. 6786, U. S. National Museum.

Empis tenebrosa, n. sp.

Black; third joint of antennæ elongate, sublanceolate, nearly three times as long as wide, only slightly longer than the style, front and face polished, proboscis five times as long as height of head; thorax and scutellum opaque, gray pruinose, the hairs and bristles black, scutellum bearing two bristles; abdomen slightly polished; legs rather slender, middle metatarsi noticeably more slender than the others, legs bearing many rather short bristly hairs and with scales on the inner and outer sides of the front

tibiæ, and on the upper side and a few on the apical fourth of under side of the middle and hind femora; wings brownish, stigma dark brown, fourth vein obliterated before reaching the wing-margin, first posterior cell of the same width as the first submarginal, sixth vein prolonged to the wing margin. Length, 4 mm.

Two females collected at Las Vegas Hot Springs, New Mexico, August 7, by Mr. H. S. Barber, and Rio Ruidosa, White Mountains, New Mexico (altitude about 6500 feet), July 19, by Mr. C. H. T. Townsend.

Type.—No. 6787, U. S. National Museum.

Empis squamipes, n. sp.

Black; front opaque, gray pruinose, third joint of antennæ pear-shaped, less than twice as long as wide, slightly shorter than the style, proboscis five times as long as height of head; body opaque, gray pruinose, hairs and bristles black, scutellum bearing two bristles; legs slender, the hind ones noticeably dilated, hind metatarsi much thicker than the others and bearing several bristly hairs, under side of front femora and apical third of outer side of their tibiæ bearing a few narrow scales, both sides of the remaining femora and tibiæ densely beset with long scales, smallest on inner side of the middle tibiæ; wings hyaline, pale smoky at the base and along the costa, stigma wanting, first submarginal and first posterior cells equal in width, fourth and sixth veins obliterated before reaching the wing-margin. Length, 3 mm.

A female specimen collected at the head of Rio Piedras Verdes, Sierra Madre, Chihuahua, Mexico (altitude about 7500 feet), August 11, by Mr. C. H. T. Townsend.

Type.—No. 6788, U. S. National Museum.

Empis frontalis, n. sp.

Black, the palpi, halteres, and apical portion of claspers, yellow; eyes widely separated, facets of a uniform size, front and face opaque, thinly gray pruinose, a stripe of short hairs on each side of middle of front, third joint of antennæ sublanceolate, slightly over twice as long as broad, as long as the style, proboscis two and one-half times as long as height of head; body opaque, gray pruinose, hairs and bristles black, mesonotum marked with four black vittæ, a large cluster of bristly hairs above the front coxæ, scutellum bearing about ten bristles, hypopygium rather large, filament hidden except near the base; legs robust, femora of male bearing many hairs and bristles, tibiæ almost bare, metatarsi slender and of nearly an equal thickness; wings hyaline, stigma obsolete, veins complete, yellow, becoming brown apically. Length, 6 mm.

A specimen of each sex collected on St. George Island, Alaska, July 26, by Prof. Trevor Kincaid.

Type.—No. 6789, U. S. National Museum.

Lamprempis setigera, n. sp.

♂. Head greenish black, occiput opaque, gray pruinose, eyes contiguous, the upper facets much larger than the lower, antennæ dark brown, the two basal joints yellowish, the third lanceolate, three times as long as wide, almost twice as long as the style, proboscis brown and yellowish, one and one-half times as long as height of head; body polished, metallic green, the abdomen partly steel-blue and violet, pleura opaque, gray pruinose, the hairs and bristles black, scutellum bearing about ten bristles, hypopygium large, open, the lower piece directed forward along the venter, at its apex bearing a long, arcuate, yellow seta, under side of hypopygium and the venter bearing several long, bristly hairs; coxæ and femora yellow, tibiæ and tarsi brownish, femora beset with short hairs, outer side of tibiæ bearing several rather long bristles, front metatarsi considerably thicker than any of the others; wings grayish hyaline, stigma brown, veins between first three posterior cells becoming subobsolete at their apices, sixth vein obliterated before reaching the wing-margin; halteres brown. Length, 4 mm.

♀. Differs from the male, besides the sexual characters, as follows: Upper side of middle femora bearing several dilated bristles, the under side, as well as both sides of the hind femora and their tibiæ, ciliate with scales.

Three males and two females collected at Baracoa, Cuba, in August and September, by Mr. August Busck.

Type.—No. 6793, U. S. National Museum.

MYRMELEONIDÆ FROM ARIZONA.

By Rolla P. Currie.

As first contemplated, this paper was to be simply a report upon the ant-lion flies collected in Arizona by Messrs. E. A. Schwarz and H. S. Barber during the summer of 1901. Afterwards the writer decided to enlarge its scope and, following the example of Mr. Nathan Banks in his recently published paper, "Neuropteroid Insects from Arizona,"* make it as complete a list as possible of the Arizona species.

Up to the year 1897 but little was known concerning the Myrmeleonidæ of Arizona. Hagen's "Synopsis of the Neuroptera of North America" contains no Arizona records in this group of insects, and there are but two in his "Stray Notes on Myrmeleonidæ."† Much of our present knowledge concerning the ant-lion flies of this Territory is due to the efforts of Dr. R.

*Proc. Ent. Soc. Wash., v, No. 4, pp. 237–245 (author's extras published April 29, 1903).

† These are: *Brachynemurus carrizonus* Hagen, Can. Ent., xx, No. 5, p. 94, May, 1888, and *B. sackeni* Hagen, *loc. cit.*, p. 95. Both are from Tucson.

E. Kunze, who, during the years 1896 to 1898, made quite extensive collections, principally at Phœnix and Prescott, though he also obtained specimens at Bowie, Camp Creek, Goldfield, Huachuca, Nogales, Tucson, Senator and Wickenburg. His material is now contained in the collection of Mr. Charles C. Adams, in that of Mr. Nathan Banks, and in the U. S. National Museum. In 1897 Mr. H. G. Hubbard collected a few specimens in the Chiricahua Mountains, and at Fort Grant, Tucson, San Simon, Willcox and Fort Yuma. In 1898 Mr. E. A. Schwarz, in company with Mr. Hubbard, secured several species in the Santa Rita Mountains, at Catalina Springs, near the old Camp Lowell, at Oracle, and at Tucson. The Barber and Schwarz collection was made at Bright Angel (Grand Canyon of the Colorado River), Flagstaff, Prescott, Williams, Winslow, and at Hot Springs, in Yavapai County. Finally, Mr. E. J. Oslar made collections at the following localities: Congress, Hot Springs, Jerome, Prescott, Rio Verde and Thumb Butte. The Hubbard, Schwarz and Barber specimens are in the National Museum, and the specimens from Oslar in the collection of Mr. Nathan Banks. A few individuals labeled "Ariz.," from the American Entomological Society collection, and two in the National Museum from "So. Arizona" (O. C. Poling), are also included.

The following list embraces thirty species and two varieties, including the nine forms—seven species and two varieties—here considered as new and so described. These figures will be appreciated when we remember that, including these new forms, hardly more than fifty recognized species are now known from the entire United States, and of this number eleven species and one variety are not yet known outside of Arizona and have been described during the last six years.

The ranges of certain species in Arizona accord well with what is known concerning geographical distribution. For example, the Lower Sonoran fauna of Phœnix includes such forms as *Brachynemurus carrizonus*, *B. quadripunctatus*, the species of *Acanthaclisis* and *Maracandula pygmaea*, while in the Transition zone (Prescott, etc.) occur more northern forms, such as *Brachynemurus nigrilabris*, *B. brunneus* and *Myrmeleon immaculatus*, variety *occidentalis*. Species of wide distribution—*B. ferox* (*peregrinus*), *B. sackeni*, *Dendroleon obsoletus*, etc.—seem to occur quite generally throughout the Territory.

I wish to express my thanks to Mr. Charles C. Adams for the use of his large and valuable collection. It gives me pleasure also to acknowledge the important assistance rendered by Mr. Nathan Banks in furnishing locality records from his duplicate and other material, and in giving me the opportunity of studying his collection, including the types of all his species.

Acanthaclisis fallax (Rambur).

Phœnix, October 4 (Kunze: 1 ♂).

This species has not, I believe, been recorded north of Mexico before.

Acanthaclisis congener Hagen.

Phœnix, May 5 to June 9 (Kunze: 3 ♂♂, 27 ♀♀); Jerome, June 25, and Rio Verde, August (Oslar).

Acanthaclisis hageni Banks.

Willcox, July 7 (Hubbard: 1 ♀); Phœnix, May 2 to August 25 (Kunze: 15 ♂♂, 23 ♀♀).

[**Myrmeleon immaculatus** De Geer.

"Ariz." (coll. Am. Ent. Soc.: 2 ♂♂).

These seem not to differ from typical examples from the eastern States, the space between the subcosta and radius lacking the row of dark spots. It seems not unlikely that the specimens have been incorrectly labeled.]

Myrmeleon immaculatus, variety **occidentalis**, n. var.

♂, ♀.—Similar to typical *immaculatus* but darker, the anterior wings with fuscous cloudings along the radius and one at tip of posterior cubital fork; sometimes also there are paler cloudings along the submedian vein and more or less generally upon the transverse veins.

Williams, July 22 to 29 (Barber and Schwarz: 3 ♂♂, 3 ♀♀); Prescott, August 5 to September 16 (Kunze: 5 ♀♀); Senator, July 13 (Kunze: 1 ♀); Jerome (Oslar: 2 ♂♂, 2 ♀♀); Prescott, June 21, and Thumb Butte, July 9 (Oslar).

Besides these Arizona specimens I have seen the following: Las Vegas Hot Springs, New Mexico, August 2 to 19, 1901 (Barber and Schwarz: 3 ♂♂, 5 ♀♀); Albuquerque, New Mexico (Oslar: 1 ♂); "Colo., 1762" (Carl F. Baker: 1 ♀); Ormsby County, Nevada, July 6 (Baker: 1 ♂); Colorado ("Cornell U. Lot 195, Sub. 3, Sub. 10, Sub. 11:" 2 ♂♂, 2 ♀♀); Golden, Colorado, bred (Dyar and Caudell: 1 ♀); Pine Grove, Colorado, bred (Dyar and Caudell: 1 ♂); Platte Canyon, June (Dyar and Caudell: 1 ♀); Denver, Colorado, bred at Washington, D. C. (A. N. Caudell: 1 ♀); Havana, Illinois, August 12, 1896 (Adams: 1 ♀); New Orleans, Louisiana (Shufeldt: 2 ♂♂); "54," no locality (1 ♂).

Type.—No. 6882, U. S. National Museum.

The type specimen is a ♂ from Williams.

Dr. Hagen, in his description of *M. immaculatus*,* speaks of the space between the mediana (radius) and subcosta being blackish, where not interrupted with yellowish. I do not find these blackish spots in any specimens from the Atlantic States, while in all my examples from the western United States the spots *do* occur. Do not the western specimens which Dr. Hagen had

* Can. Ent., xx, No. 10, October, 1888, p. 190.

before him when he drew up his description belong to the variety *occidentalis?*

Myrmeleon rusticus Hagen.

Hot Springs, June 28 (Barber and Schwarz: 1 ♂); Phœnix, May 22 to September 25 (Kunze: 5 ♂♂, 6 ♀♀); Prescott, June 10 (Oslar: 1 ♀).

Psammoleon ingeniosus (Walker).

Phœnix, June 10 to September 26 (Kunze: 4 ♂♂, 11 ♀♀); Hot Springs, July (Oslar: 1 ♀).

Psammoleon sinuatus, n. sp.

♂.—Differs from *P. ingeniosus* in that the two oblique fuscous streaks on the anterior wings are connected by a straight streak situated two cells below the anterior fork of the cubitus, thus forming a single, doubly sinuate line. In all other respects the description of the latter species seems to apply equally well to this.

Length 22, alar expanse 58, greatest width of anterior wing 5.5, antenna 6 mm.

Santa Rita Mountains, May 31 (Schwarz: 1 ♂).

Type.—No. 6883, U. S. National Museum.

In the collection of Mr. Charles C. Adams is another, much larger specimen, paratype, with antennæ and apical segments of the abdomen missing, taken in Bear Creek Canyon, Colorado, July 10, 1897, by Mr. E. J. Oslar. Its measurements are as follows: alar expanse 72, greatest width of anterior wing 8 mm.

Maracandula pygmaea (Hagen).

Hot Springs, June 21 and 22 (Barber: 1 ♂, 1 ♀); Santa Rita Mountains, June 16, and Madera Canyon, Santa Rita Mountains, June 17 (Schwarz: 1 ♂, 2 ♀♀); Phœnix, May 16 to July 15 (Kunze: 3 ♀).

Dendroleon obsoletus (Say).

Williams, July 27 (Barber and Schwarz: 1 ♂); Santa Rita Mountains, June 16 (Schwarz: 1 ♀).

Brachynemurus abdominalis (Say).

Prescott, July (Oslar), on the authority of Mr. Banks.

Although I have seen no Arizona specimens of this species, yet it would be natural to expect to find it in the faunal zone of Prescott.

Brachynemurus nigrilabris Hagen.

Prescott, June 9 to September 10 (Kunze: 12 ♂♂, 8 ♀♀ and 2 —); June 30 (Oslar).

Brachynemurus carrizonus Hagen.

Willcox, July 24 (Hubbard: 1 ♀); Phœnix, May 10 to September 22 (Kunze: 104 ♂♂, 107 ♀♀); Bowie, May 19 (Kunze: 1 ♂); "Ariz." (coll. Am. Ent. Soc., 2 ♂♂, 4 ♀♀).

Brachynemurus quadripunctatus Currie.

Phœnix, May 13 to September 4 (Kunze: 97 ♂♂, 162 ♀♀).

Brachynemurus ferox (Walker).

Bright Angel, July 10 and 13 (Barber and Schwarz: 2 ♂♂, 1 ♀); Chiricahua Mountains, June 28 (Hubbard: 1 ♀); Tucson, May 13 (Hubbard: 1 ♀); Madera Canyon, Santa Rita Mountains, June 14 to 17 (Schwarz: 3 ♂♂, 3 ♀♀); Catalina Springs, May 8 and 10 (Schwarz: 3 ♂♂); Phœnix, April 25 to August 7 (Kunze: 4 ♂♂, 3 ♀♀); Prescott, June 22 (Kunze: 1 ♀); Nogales, June 9 (Kunze: 1 ♀); Tucson, May 9 to May 20 (Kunze: 1 ♂, 1 ♀ and 1 —); Jerome, June 27 and June — (Oslar: 3 ♀♀); Thumb Butte, July 9 (Oslar: 1 ♂); Prescott, June 9 and June — (Oslar: 3 ♂♂); "Ariz." (coll. Am. Ent. Soc.: 15 ♂♂, 7 ♀♀).

I concur with Mr. Banks in his belief that *B. peregrinus* Hagen is the same as *B. ferox*.

Brachynemurus longipalpis Hagen.

San Simon, July 5 (Hubbard: 1 ♂, 2 ♀♀); Willcox, July 24 (Hubbard: 1 ♂); Oracle, June 27 and July 2 (Schwarz: 3 ♂♂); Phœnix, June 13 to August 10 (Kunze: 3 ♂♂, 8 ♀♀); Hot Springs, July (Oslar: 1 ♂, 5 ♀♀).

Brachynemurus sackeni Hagen.

Tucson, April 4 and July 5 (Hubbard: 2 ♂♂, 1 ♀); Fort Yuma, April 4 (Hubbard: 1 ♀); Catalina Springs, April 8 and 12 (Schwarz: 7 ♂♂, 7 ♀♀); Phœnix, April 5 and 20 (Kunze: 1 ♂, 1 —); Goldfield, April 14 (Kunze: 1 ♀, 1 —); Nogales, May 25 (Kunze: 1 ♂); Congress, May 6, 7, and — (Oslar: 4 ♂♂, 1 ♀ and 1 —); Hot Springs (Oslar: 2 ♀♀).

Brachynemurus niger Currie.

Prescott, June 20 (Barber and Schwarz: 1 —); Fort Grant, July 20 (Hubbard: 1 ♀); Prescott, June 29 and July 1 (Kunze: 1 ♀, 1 —); Camp Creek, August (Kunze: 1 ♀).

Brachynemurus brunneus Currie.

B. centralis Banks.

A comparison of the types of the two species shows them to be identical.

Prescott, June 10 (Oslar: 1 ♀).

Brachynemurus papago Currie.

Madera Canyon, Santa Rita Mountains, June 7 (Schwarz: 1 ♂, 1 ♀).

Brachymemurus coquilletti Currie.

San Simon, July 5 (Hubbard: 3 ♂♂); Phœnix, June 6 to August 30 (Kunze: 2 ♂♂, 3 ♀♀, 1 —).

Mr. Banks* has made this species a synonym of Hagen's *blandus*, but this is certainly a mistake. I have recently seen specimens quite distinct from *coquilletti* which correspond per-

*Ent. News, x, No. 6, p. 171, June, 1899.

fectly with Hagen's description.* In these specimens the ♂ appendages are much longer and more slender than in *coquilletti*, at least half as long as the last abdominal segment; the tibial spurs are not longer than the two basal joints of the tarsi, while in *coquilletti* they are as long as the *four* basal joints. There are also other differences.

Brachynemurus hubbardii Currie.

B. cockerelli Banks.

I have examined the type of *cockerelli* and can find no difference between it and this species. Mr. Banks, in the remarks following his description,† says: "From *B. hubbardi* it is distinct by the yellow color, markings of head, etc." But typical *hubbardii is* yellow or yellowish, and the markings of the head are not, in my opinion, essentially different; in some examples of the new variety *nubeculipennis* the longitudinal median line on the face is not apparent, showing that these head markings are subject to variation. The confusion as to color may be explained by the fact that, at the time *cockerelli* was described, Mr. Banks did not possess true *hubbardii*, all his specimens belonging to *nubeculipennis*.

Brachynemurus hubbardii, variety **nubeculipennis**, n. var.

♂, ♀.—Very similar to typical *B. hubbardii*, but smaller, luteous instead of yellowish, rather densely hirsute, the fore wings narrower, quite extensively and evenly sprinkled with fine fuscous cloudings—principally on the smaller forks and the extremities of the transverse veins; the hind wings also sometimes have similar, but fainter, cloudings, or at least have one at tip of median vein.

Length, ♂ 39.8, ♀ 28.1; alar expanse, ♂ 41.4, ♀ 48; greatest width of anterior wing, ♂ 5, ♀ 6.2; antenna, ♂ 7, ♀ 5.3 mm.

Phœnix, June 27 to September 18 (Kunze: 18 ♂♂, 32 ♀♀); Prescott, August 21 to 31 (Kunze: 2 ♂♂, 1 ♀); "So. Arizona" (Poling: 1 —).

Type.—No. 6884, U. S. National Museum.

I can find no other differences between this and typical *hubbardii*, yet the two forms are readily distinguished in nearly every case. One specimen cited above, "So. Arizona, Poling," is similar in color to the variety *nubeculipennis*, but the wings are not more spotted than in the typical form and the wing-veins are yellowish instead of luteous. It is somewhat uncertain to which form it should be assigned and it may be best to class it as an intermediate. Two other luteous specimens, broken, from Columbus, Texas, July, 1879 (E. A. Schwarz), and Carrizo Springs, Texas, August 25, 1885 (Dr. A. Wadgymar), probably belong to the variety, though the latter specimen has small, al-

*Can. Ent., xx, No. 4, pp. 73, 74, April, 1888.

† Ent. News, XIII, No. 3, p. 86, March, 1902.

most imperceptible, wing cloudings, and may possibly be a faded *hubbardii*. The three specimens from Prescott are unusually dark and are heavily marked.

Brachynemurus pusillus Currie.

Fort Grant, July 12 and 23 (Hubbard: 2 ♀♀); Madera Canyon, Santa Rita Mountains, June 14 (Schwarz: 1 ♂).

Brachynemurus pallidus Banks.

Phœnix, September 19 to October 12 (Kunze: 9 ♀♀); Prescott, June 27 (Oslar: 1 ♂).

As the ♂ of this species has never before been found, I give here a description of Oslar's specimen:

♂.—More slender than the ♀, yellowish, the markings dark fuscous instead of brownish, and more extended.* Antennæ less clavate. Vertex with two transverse piceous stripes, the rear one interrupted at the middle.† Prothorax with a pair of longitudinal, submedian dorsal lines, interrupted behind the transverse furrow and resumed in front of it. Each of these lines, at base, is connected with the lateral stripe on the same side.‡ Meso- and metathorax plainly marked; anterior lobe of mesonotum with two dark spots in front and two behind; lateral lobes fuscous anteriorly and externally and with a spot near mid-dorsal line; posterior lobe with two spots in front and one at middle of hind margin; posterior angles each with two longitudinal lines. Metathorax bordered with fuscous on sides, an X-shaped mark in the middle, a spot on each lateral lobe and a median line from front to rear on posterior lobe. Abdomen longer than the wings. Appendages longer than the last abdominal segment, slender, cylindrical, yellowish, clothed with coarse dark hairs or bristles, the tips curved inwards. Legs with a fine, dark, interrupted ring before middle of tibiæ.§ Tibial spurs as long as first tarsal joint. Wings more slender than those of the ♀.

Length 21, alar expanse 35, greatest width of anterior wing 4, antennæ, 4.3 mm.

Brachynemurus minusculus Banks.

Winslow, July 31 (Barber and Schwarz: 1 ♂).

This specimen differs somewhat from the type and from other examples I have examined. It is paler, the apical joint of maxil-

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*It is of course possible that ♀♀ from Hot Springs, the locality from which this ♂ was taken, may turn out to be like the latter in respect to color and extent of markings.

† The anterior stripe is present in all specimens I have seen, though not mentioned in Mr. Banks' description. It is sometimes interrupted in the middle. The two dots he speaks of (Ent. News, x, No. 6, p. 171, June, 1899), are the remnants of the interrupted posterior stripe.

‡ The longitudinal submedian lines are present basally in some ♀♀, though very short.

§ Sometimes apparent in the ♀♀ also.

lary and labial palpi not black but luteous, tinged with rufous, the superior dark line on middle and posterior femora merely indicated by a number of more or less confluent dots.* The wings, too, are less heavily marked. These differences do not seem to justify making this a new species, although additional material may show it to be a good geographical race.

Brachynemurus tuberculatus Banks.

Madera Canyon, Santa Rita Mountains, June 8 and 14 (Schwarz: 1 ♂, 2 ♀♀); Hot Springs, July 1 (Oslar: 1 ♂).

Brachynemurus delicatulus, n. sp.

♂.—Slender, yellowish, with rather sparse white hairs. Face piceous above, except a yellowish spot just behind the antennæ; inter-antennal mark short, narrowly bordering the antennæ in front and sending a median line towards the clypeus. Mouth parts luteous; labrum three times as broad as long, not emarginate; labial palpi somewhat longer than maxillary, third joint very stout fusiform, rufo-piceous around ocelloid spot, the tip fine and cylindrical. Maxillary palpigers rufo-piceous at their elbows. Antennæ strongly clavate, a little shorter than head and thorax, fuscous, with pale articulations; joint 1 principally luteous; 2 piceous except at base, conspicuously wider than third and following joints. Vertex rufo-fuscous, a pair of yellowish spots at middle of posterior border and other indistinct spots on sides and in front.

Prothorax marked with a pair of longitudinal fuscous stripes which are broad and approximate behind, narrowed and widely separated in front and ending in the transverse furrow; lateral margins behind the furrow and a stripe each side below fuscous. Mesothorax fuscous, marked dorsally with yellowish as follows: a spot in front of each wing; two subtriangular, almost connected, spots near middorsal line on lateral lobes and a small one at base of wing; posterior angles; rear portion of posterior lobe except an indistinct longitudinal dark line in the middle. Metathorax fuscous, varied with yellowish very much as in the mesothorax. Sides and sterna with small yellowish markings.

Abdomen fuscous, a line each side and an apical ring on the segments yellowish; appendages extremely short, obtuse, yellowish, clothed with long white hairs. Legs unspotted, beset with black and white spines, the anterior and middle coxæ fuscous at base; tibial spurs as long as first four tarsal joints; tarsal joints piceous apically, 2, 3 and 4 almost entirely that color; claws as long as joint 5 of tarsi. Wings a little longer than the abdomen, hyaline, unspotted, slightly falcate at tips—shaped as in *B. coquilletti*; pterostigma luteous, fuscous within, a very few intercostals forked before it; veins luteous, interrupted with fuscous—principally at their junctures; submediana pale; membranule of hind wings with a pale tuberculiform

* Although the fact is not indicated in the original description, this dark line occurs only on the middle and hind femora, the anterior femora being wholly pale.

process which is tipped with a broad brush of short, rufous hairs or bristles.

Length 18, alar expanse 33.5, greatest width of anterior wing 4.3, antenna 3.4 mm.

Phœnix, "desert," May 11, 1898 (Kunze: 1 ♂).

Type.—No. 6885, U. S. National Museum.

A beautiful little species, suggesting *B. coquilletti* in the shape of the wings. It appears to be the smallest known member of the genus, although *B. pusillus* is very nearly as diminutive.

Brachynemurus schwarzi, n. sp.

♂.—Extremely slender, fuscous, clothed with black hairs. Face luteous, piceous above; inter-antennal mark rather short, emarginate, bordering the antennæ in front and sending a median line towards the clypeus. Labrum luteous, four times as broad as long, not emarginate. Maxillary palpi luteous, tinged with piceous, the articulations pale. Labial palpi somewhat longer than the maxillary, rufo-piceous, with pale articulations; third joint rather stout fusiform. Under parts of head luteous, the base of mentum, and elbows and tips of maxillary palpigers, piceous. Antennæ clavate, a little shorter than head and thorax, fuscous, with luteous articulations, the club partly pale; joints 1 and 2 clouded with piceous; 1 set in a luteous ring and mostly that color behind. Vertex luteous, a broad, irregular, interrupted band behind and a narrower one in front—sometimes interrupted, fuscous.*

Prothorax luteous, a longitudinal mid-dorsal stripe, divided lengthwise by a pale median line, and two stripes each side, fuscous; beneath luteous, two fuscous spots at sides near base. Mesothorax fuscous, luteous as follows: a spot on each side of anterior lobe in front and some indistinct ones behind, some spots near base of wings, a divided spot on the inner side of each lateral lobe, hind border and longitudinal middorsal line on posterior lobe, and outer margins of posterior angles; sides and sterna varied with luteous. Metathorax with very similar markings.

Segments of abdomen luteous in the middle and at their articulations; appendages like those of *B. sackeni*, but shorter, 2 mm. in length, not as long, although more than half as long, as last abdominal segment. Legs with large black and white spines, luteous, piceous as follows: middle and base of coxæ; anterior and middle femora externally and tips of hind femora; three rings, interrupted on inner side, on the tibiæ—one at base, one before the middle and one before the apex; apices of first and fifth, and all of third and fourth, tarsal joints. Tibial spurs as long as joints 1–3 of tarsi; claws a little shorter than joint 5. Wings much shorter than abdomen, hyaline with a slight smoky tinge; forewings heavily clouded with fuscous upon most of the transverse veins; hind wings faintly clouded; pterostigma whitish, fuscous within, a few intercostals forked before it; veins luteous, interrupted with fuscous—principally at their

*There are usually two luteous spots in the posterior band—near the middle.

junctures; membranule of posterior wings with a small tuberculiform luteous process tipped with a thin brush of short hairs or bristles.

♀.—Similar to the ♂, but the abdomen shorter, little longer than the wings, the latter broader. Tip of abdomen dark, spinous, the two cylindrical inferior appendages clothed with long dark hairs.

Length, ♂ 44, ♀ 26; alar expanse, ♂ 47, ♀ 52; greatest width of anterior wing, ♂ 5.7, ♀ 7; antenna, ♂ ♀ 4 mm.

Flagstaff, July 4 (Barber and Schwarz: ♂♂2); Williams, July 5 to 27 (Barber and Schwarz: 6 ♂♂, 7 ♀♀).

Type.—No. 6886, U. S. National Museum.

The type specimen is a ♂ from Flagstaff. This species resembles *B. sackeni* in the markings of the abdomen, shape of the ♂ appendages and form and markings of the wings. It presents many differences, however, among which are: its larger size, longer ♂ abdomen, shorter appendages, more slender and darker thorax, much longer tibial spurs and more heavily and uniformly clouded transverse wing veins. Mr. Barber reports that the specimens, five in number, collected on July 9, were all found in the early morning under one stone.

Brachynemurus yavapai, n. sp.

♀.—Slender, fuscous, with black and white hairs. Face luteous, piceous above and clouded throughout; inter-antennal mark long, deeply notched, bordering the antennæ in front and sending a median line to the clypeus. Labrum clouded with piceous, little more than twice as wide as long, very slightly emarginate. Palpi piceous, the articulations pale; labials slightly the longer, the third joint stout fusiform, tip fine. Under parts of head luteous, the maxillary palpigers piceous at base, elbow and apex, the mentum and labial palpigers tinged or clouded with the same. Antennæ somewhat shorter than head and thorax, clavate, luteous below; above fuscous, with luteous articulations; joints 1 and 2 piceous with pale articulations, 1 set in a luteous ring. Vertex luteous, the posterior third or more and the longitudinal furrow piceous; in front of this a transverse light brown band.

Prothorax luteous, with a single large fuscous mark formed by the joining of a broad middorsal stripe, extending from base to apex, with two lateral stripes each side; inner lateral stripe reaching forward only to the transverse furrow, the outer one still shorter; lateral margins with a small fuscous spot at extreme base; beneath are two fuscous spots at sides near base. Anterior lobe of mesothorax fuscous, a luteous spot each side; lateral lobes principally luteous, a U-shaped marking whose branches point backward springs from the fuscous anterior portion, a shining fuscous dot behind outer branch of the U; posterior angles fuscous, margins luteous; posterior lobe luteous, two approximate middorsal stripes on anterior half and a median dot on hind margin fuscous. Metathorax fuscous, an inner spot on each lateral lobe, and all of the posterior lobe except a median dot on hind margin, luteous. Sides and sterna varied with luteous.

Abdomen fuscous, the segments with a luteous band across the middle, the venter largely luteous; tip luteous, spinous, the two inferior appendages clothed with dark hairs or bristles. Legs beset with black spines, luteous, piceous as follows: the coxæ principally; the femora exteriorly and at tips; three narrow bands on tibiæ, one at base, one before middle and one at apex;* tips of tarsal joints. Tibial spurs not longer than first, and claws a little shorter than fifth. tarsal joint. Wings a little longer than abdomen, hyaline; fore wings heavily clouded with fuscous on most of transverse veins; hind wings with a faint clouding at tip of submedian vein and at apical forks; veins luteous, interrupted with fuscous—principally at their junctures; pterostigma whitish, fuscous interiorly, a few intercostals forked before it.

Length, 21; alar expanse, 38.5; greatest width of anterior wing, 5.5; antenna, 4.5 mm.

Hot Springs, Yavapai County, June 26, at light (Barber and Schwarz: 1 ♀).

Type.—No. 6887, U. S. National Museum.

This species resembles *B. sackeni* and *B. schwarzi*, but is darker than the former and the markings of head and thorax are different from those of either species; the abdomen, too, has luteous bands at middle of segments only, on dorsum—*not* at articulations.

Brachynemurus barberi, n. sp.

♀.—Very slender, fuscous, with rather dense and coarse hairs—most of them white. Face luteous, piceous above; inter-antennal mark extremely short, emarginate, reaching only half way to the sides in front of the antennæ, a longitudinal median line extending towards the clypeus. Labrum luteous, three times as wide as long, slightly emarginate. Maxillary palpi luteous, 3 piceous and 1 and 2 piceous-tinged. Labial palpi about twice as long as maxillary, rufo-piceous, articulations luteous; joints 2 and 3 each about six times as long as the first; 3 stout fusiform, largest beyond middle, abruptly narrowed to tip which is short, fine, cylindrical. Under parts of head luteous, the maxillary palpigers piceous at elbows. Antennæ considerably shorter than head and thorax, fuscous, articulations luteous; club large, pale, sprinkled with fuscous; joints 1 and 2 piceous, 1 set in a luteous ring, mostly luteous behind and partly so in front. Vertex fuscous, two transverse lines on front margin, the one in front luteous, the one behind shining fuscous; another shining fuscous band on hind part of vertex, interrupted so as to form an irregular spot or spots on each side and a twin spot at the median line.

Prothorax with three longitudinal luteous lines, one in the middle and one on each side, the lateral lines ending in the transverse furrow; beneath with two fuscous spots each side, the anterior one longitudinal, the posterior tranverse. Meso- and metathorax with a few very indistinct pale markings. Abdomen with indistinct pale spots on the middle of

*These bands are sometimes interrupted within.

segments on dorsum; tip spinous, densely hirsute Legs beset with black and white spines and hairs, the anterior femora with remarkably long, coarse white hairs; coxæ and femora piceous, the anterior coxæ partly luteous; tibiæ with three piceous bands, one at base, one before the middle (sometimes interrupted on inner side) and one at the apex; on the anterior and middle tibiæ these bands are broad so that the prevailing color is dark; tarsal joints 1 and 5 apically, and all of 2, 3 and 4, piceous. Tibial spurs as long as first four tarsal joints on front legs, as long as first three on hind and middle legs; claws a little shorter than joint 5.

Wings a little shorter than the abdomen, narrow, hyaline; the anteriors with small fuscous spots—principally along the cubitus and its forks, the anal vein, and the forks near hind margin and apex of wing; a fine fuscous streak extending obliquely forward from tip of median vein; a larger fuscous spot at the apical radial cross vein and a smaller one at junction of subcosta and radius—these last two spots the only ones present on hind margin; veins luteous, interrupted with fuscous—principally at their junctures; pterostigma whitish, fuscous within, one to three intercostals forked before it in fore wings, none in hind wings.

Length 23, alar expanse 38, greatest width of anterior wing 4.3, antenna 3 mm.

Hot Springs, June 26 and 27 (Barber and Schwarz: 3 ♀♀).

Type.—No. 6888, U. S. National Museum.

This species is about the size and shape of *B. pusillus* but is darker, the markings are different, the abdomen longer, the wings longer, more slender and more heavily marked, the tibial spurs much longer, and the labial palpi very much longer and stouter and of different shape.

Brachynemurus intermedius, n. sp.

♂.—Very similar to *B. texanus* Banks in size, shape, and general appearance. It differs from that species as follows: anterior portion of the vertex fuscous, confluent with the inter-antennal mark; a single transverse band, interrupted in the middle, on the elevated portion, appearing as two large, approximate spots which are broadest within. Pronotal stripes heavier and longer, sometimes almost coalescent at transverse furrow and anterior margin, making the pronotal pattern much as in *B. ferox*, the outer as well as the inner pair surpassing the transverse furrow and barely interrupted. It lacks the pair of spots near hind margin of the posterior lobe of mesonotum and the dot on each lateral lobe of metanotum. Appendages of ♂ longer, fully half as long as last abdominal segment. Wings less heavily though similarly marked, narrower, with very few transversals forked before pterostigma (in *texanus* quite a number are forked).

♀.—Similar to the ♂, but stouter and darker, the wings averaging broader, the markings somewhat heavier, the antennæ more clavate. Tip of abdomen spinous, partly pale.

Length, ♂ 33, ♀ 27; alar expanse, ♂ 48, ♀ 54; greatest width of anterior wing, ♂ 5.2, ♀ 6.8; antenna, ♂ 6.5, ♀ 6 mm.

Phœnix, April 18 to September 6 (Kunze: 2 ♂♂, 5 ♀♀); Wickenburg, May 18 (Kunze: 1 ♂).

Type.—No. 6889, U. S. National Museum.

This species has the wing markings of *B. carrizonus* and in the markings of head and thorax suggests *B. ferox.*

Brachynemurus singularis, n. sp.

♂.—Very similar to *B. quadripunctatus* but more slender and with the following differences: inter-antennal mark not divided by a transverse luteous stripe between the antennæ but with a small luteous spot in place of it. Vertex with two transverse stripes in front which are broadly interrupted in the middle; an indication of the posterior row of four dots, but only the middle pair are plain. Thoracic markings similar but with two widely separated dots on hind margin of posterior mesothoracic lobe. Appendages like those of *B. carrizonus.*

Length 34, alar expanse 46.6, greatest width of anterior wing 5.5 mm., antenna (lacking).

Phœnix, October 28 (Kunze: 1 ♂).

Type.—No. 6890, U. S. National Museum.

It was for a long time a problem where to place this specimen. The identity of the appendages with those of *B. carrizonus* naturally suggested that it might be a variety of that species. But the great differences in the markings and the many resemblances to *B. quadripunctatus* seemed to forbid this solution of the difficulty, and it appears more logical to consider it distinct from either species.

March 12, 1903.

The 176th regular meeting was held at the residence of Dr. L. O. Howard, 2026 Hillyer Place, N.W. Vice-President Banks occupied the chair, and Messrs. Ashmead, Barber, Busck, Currie, Dyar, Gill, Hopkins, Howard, Kotinsky, Marlatt, Pollard, Quaintance, Simpson, and Warner, members, and Dr. W. J. Holland and Messrs. H. E. Burke and J. L. Webb, visitors, were also present.

Mr. W. D. Kearfott, 114 Liberty street, New York city, was elected a corresponding member, and Messrs. H. E. Burke and J. L. Webb, of the Bureau of Forestry, U. S. Department of Agriculture, active members.

Mr. Busck announced that some of the members of the Society had planned to go on an entomological field excursion to Bladensburg, Maryland, on March 26, and extended a general invitation to the other members to join them.

—Mr. Ashmead exhibited two species of wasps from Trong,

Lower Siam, collected by Dr. W. L. Abbott. The first of these was *Vespa doryloides* Saussure, a curious species bearing a superficial resemblance to male ants of the genus *Dorylus* as well as to species of the genera *Eciton* and *Labidus*. They represent a distinct genus for which Mr. Ashmead proposed the name *Provespa*. The other species was a single specimen belonging to the genus *Ischnogaster*. This genus is found only in the tropics, and is most numerously represented in India. The species of the genus have, until recently, been classified with the social wasps *Polistes* and *Vespa*, but in reality belong in the family Eumenidæ. Although the Eumenidæ belong with the solitary wasps, yet some Indian species of *Eumenes*, as well as certain species of *Ischnogaster*, are said to be social.

—Mr. Ashmead showed also a specimen of the large wasp, *Vespa mandarina* Smith, from Japan. It belongs in the genus *Vespula* Thomson.

—Dr. Dyar presented the following note for publication:

NOTE ON CRAMBUS OFFECTALIS HULST AND ALLIED FORMS.

(*Evetria neomexicana*, n. sp.)

By Harrison G. Dyar.

Hulst described "*Crambus offectalis*" in 1886, saying it "Takes a place best in the *exciccatus* group." The species is, however, really a Tortricid, and was rescued from its erroneous position by Prof. Fernald, who placed it in *Pædisca* (♂ with costal fold) in Smith's list of 1891. Since then Prof. Fernald has obviously received males, since in Bulletin 52, U. S. National Museum, he removes it to *Thiodia* (*Semasia*), which has no costal fold in the male, and he makes *bucephaloides* Walsingham a synonym of it. Prof. Fernald has kindly identified a specimen of *T. offectalis* for me, and I have six others, all collected in Colorado. This identification is, I believe, correct, for Hulst's description applies to my specimens. The species has a structural peculiarity in that vein 4 of hind wings is coincident with 3, appearing absent. The same structure appears in *obliterana* Wals., and, according to Walsingham,* in *elongana* Wals. and in the European *pupillana* Linn. and *wimmerana* Treit. I think that these species ought to be separated generically from *Thiodia* on this character, but I am not prepared to say what generic name should be used. Now, *bucephaloides* Wals. does not look to me anything like *offectalis* Hulst; besides which it has veins 3 and 4

* Ill. Lep. Het. Brit. Mus., IV, p. 56, 1879.

of hind wings stalked, not coincident.* Therefore the synonymy given in Bulletin 52 must be erroneous.

Lately Cockerell described† a Tortricid larva injuring pine in New Mexico, and identified the adult as *Semasia offectalis* Hulst, on Prof. Fernald's authority. I do not know the conditions affecting this determination, but it is certainly erroneous as applied to the species about which Prof. Cockerell intended to write. Prof. Cockerell has just sent me a specimen with a pupa skin accompanying it, and labelled "Las Vegas, N. M. (Ckll.) *Semasia offectalis* (Hulst)." It is certainly not the species so named for me by Prof. Fernald, but appears to be a true *Retinia* (*Evetria*). I would describe it as follows:

Evetria neomexicana, n. sp.

Head ocherous on vertex mixed with rust red. Thorax dark gray, the patagia in front dark brown. Wings much elongated, the outer margin more oblique than usual. Dark gray, blackish and cinereous scales mixed, the dark strigæ forming irregular transverse bars. Outer third of wing on costal half, extending to outer half on inner portion below cell light ocherous, pinkish tinged, dark red brown on outer margin; a black dash from end of cell to middle of termen, with a trace of another above it out wardly; costal edge gray with pale dashes. Fringe dark gray, paler a base, dark red at apex. Hind wings gray, fringe concolorous, faintly interlined at base and outwardly with darker. Expanse, 24 mm.

One male, Las Vegas, New Mexico (Cockerell).

Type.—No. 6802, U. S. National Museum.

Resembles in pattern of coloration *Thiodia bucephaloides* Wals. and *Eucosma* (?) *edemoidana* Dyar.

—Mr. Barber read the following letter, written from Cuba, by Mr. Schwarz:

A LETTER FROM CUBA.

CAYAMAS, CUBA, *March* 3, 1903.

During a brief stay at Havana I looked over the Gundlach collection, which is now preserved in a large room in the Second High School building on Obispo street. The collection illustrates the whole domain of zoology of Cuba, including the birds and some insects of Porto Rico. It is in excellent state of preservation, but the smaller species of insects cannot be examined closely because they are in rather high and hermetically sealed glass boxes. The collection does not contain any types, but is manifestly of considerable value to the student of Cuban entomology.

On February 19th I set out for my destination, but not being

* See Walsingham's figure, Trans. Ent. Soc. Lond., Pl. XII, fig. 17.

† Ent. News, XII, p. 317, 1901.

acquainted with the exact location of Cayamas I had of course some trouble in getting there. However, after spending an entire day on the railroad and changing cars twice, I finally reached Campiñas, from which place a two hours' ride in a Cuban volanta brought me and my baggage safely to Cayamas, where I was most hospitably received by Mr. Eduardo Ferrer.

Cayamas is in the southwestern part of the province of Santa Clara, about 5 miles northwest of Yaguaramas, and only about 8 miles distant from the south coast. The country hereabout is almost flat, or rather very gently rolling, the more elevated parts being dry and rather sandy, the soil of the lower portions consisting of a red loam.

This being the dry season here, which corresponds with our northern winter, flora and insect fauna are more or less dormant in spite of the warm weather, and vegetables can only be raised by means of constant irrigation. Hardly any flowers are to be seen anywhere; a few common looking butterflies are flying about; also three or four species of dragon flies; a large Anthrax and a large syrphid fly are common enough on the paths; mosquitoes and Hippelates flies are locally quite abundant, but other Diptera are not obvious at this season. Hymenoptera are still scarcer; a gigantic Scoliid and a jet black carpenter bee are flying about, and the few flowers are visited by a multitude of wild honey bees.

There are only two small fields of cultivated cotton here besides a number of scattered wild cotton plants, all of which have been examined by me with great care. About the original food plant of *Anthonomus grandis* I have reported my observations to Dr. Howard. The few other species of insects that can be found feeding on cotton have but little economic importance except the cotton stainer, *Dysdercus suturellus*, and the "*bibijagua*" (*Atta cephalotes*).

In my search for any other possible food plant of *Anthonomus grandis* I have of course examined every malvaceous plant I could discover, and I am also vigorously using my beating net and umbrella in the hope of finding this weevil upon some other plant. In doing so I am gradually accumulating quite a collection of the insects that can be found here at this early season, mostly Coleoptera. The dry sandy ridges are partly covered with dense tall grass, which is now dead, and which furnishes but a few species of insects, and partly with a sort of dry hammock resembling in general appearance the dry palmetto hammocks of central Florida, and having also a very scant insect fauna at this season.

The loamy lowlands of this region were originally covered with one mighty forest, but this has long since disappeared and is now replaced by monotonous sugar-cane fields. The insect fauna within these fields and along their edges is also monoto-

nous and not rich in species. In many places the soil has become completely exhausted by constant cultivation of the sugar-cane, and the fields are now overgrown by a perfect wilderness of tall weeds. One of these, a gigantic Solanum, has a little insect fauna of its own, which is of interest because the same species (*Anthonomus varipes*, *Baridius 4-maculatus*, *Epitrix parvula*, a sphinx larva and an aphis, with its attending Coccinellids) are to be found on the cultivated egg-plant.

A few hundred yards distant from the settlement is the only remnant of what was once an extended tropical forest—about 50 acres being still covered with mighty trees, of which I recognize only a few species. There is a delightfully dense undergrowth of smaller bushes and vines, so that locomotion is quite difficult. At the first sight this timberland seems to be occupied by only a few species of insects, viz., *Eutermes morio*, two species of Pseudomyrma (*P. pallida* and another brown species), and two species of mosquitoes. However, a little more careful investigation reveals an astonishing richness of insect life, chiefly Coleoptera. On the living vegetation very little can be seen: a few Chrysomelidæ, chiefly Halticids; a few Elateridæ, a Lampyrid, some Curculionidæ, a peculiar genus of Aleocharidæ, etc.; but on or in the dead vines and branches insects of all sorts abound in specimens and species, so that I cannot possibly enumerate them here. Among the Coleoptera the most characteristic forms are as follows: numerous species of Cryptorhynchid Rhynchophora of the genera Acalles, Cryptorhynchus, Pseudomus, etc.; numerous species of Anthribidæ, a host of small Lamiid Cerambycidæ of the genera Leptostylus, Lepturges, Hyperplatys, etc.; abundance of species and specimens of Elaphidion, a host of little Clavicorn beetles of various families, and finally a good number of small Heteromerous species.

As a whole I find the Coleopterous fauna here more different from that of semi-tropical Florida than I expected, but among the species common to both countries I notice several the occurrence of which in Cuba has not yet been recorded, *e. g.*, *Eustilbus princeps*, *Monœdus guttatus*, *Aspathines ovatus* and *Euxenus piceus*.

A good-sized creek meanders through this forest, but its bed is now dry as tinder, and the hygrophilous insect fauna has retired into cracks in the soil. I noticed, however, that at sunset at least a portion of this fauna comes out of the ground to enjoy flying about, and by spreading a white cloth many, mostly very minute, species can thus be found. Others come to light later in the evening.

A couple of miles farther out is another creek which contains a few water holes with a rather uninteresting insect fauna consisting of a few Dytiscids and Hydrophilids, with many Clivina, Falagria, Trogophlœus, etc., running about on the wet ground.

They use acetylene gas in the dwelling house, and a number of Noctuids and Microlepidoptera, all species differing from those known to me from Florida, are attracted by the light; also large and small Blattidæ and quite a number of Coleoptera, which I fail to find during daytime, the most interesting of them being a Dacoderus, which may be different from the species described by Dr. Horn from Santo Domingo.

E. A. Schwarz.

Dr. Howard said that Mr. Schwarz had found what may prove to be the original food plant of the Cotton-boll Weevil (*Anthonomus grandis* Boheman), namely, the wild "kidney cotton" (*Gossypium brasiliense?*).

—Dr. Hopkins read extracts from two letters from Mr. D. Cappelen, Sandviken, Hovin P. O., Thelemarken, Norway, concerning a recent destructive outbreak of the "Pine Bombyx" (*Dendrolimus pini* Linnæus). Since the outbreak of 1812 to 1816, the writer states, this moth has not occurred in sufficient numbers to cause serious damage, but last year one area of 1,000 acres of redwood forest (*Pinus sylvatica*) was destroyed, as well as other areas of from 50 to 100 acres, while some 25,000 acres were infested with larvæ, and their destruction threatened the coming season. The area of infestation was practically the same as in 1812—to the east and northeast of Lake Mjösen. The correspondent stated also that at the time his first letter was written (October 22, 1902), the larvæ were to be found under the reindeer moss (*Cladonia rhangiferia*), which was covered with three inches of snow. They seemed to be healthy specimens and practically free from fungus diseases. Mr. Cappelen was inclined to attribute the enormous increase of the moth to the past three or four very dry seasons. He hoped that steps would be taken to test the value of different parasitic fungi, such as the muscardine (*Cordyceps militaris*) and *Cordyceps melolonthæ*, in fighting the pest. The remedy most in vogue in preventing the spread of the larvæ was to apply a belt of German glue to the trunks of the trees. Dr. Hopkins thought that it would be well to guard against a possible introduction of the bombyx into North America.

Dr. Howard asked Dr. Hopkins what theory was put forth to explain why there had been no outbreak between 1812 and the present time in that locality. Dr. Hopkins replied that in 1812

the outbreak followed a series of dry seasons, as was the case now. He thought that such a series of dry seasons was necessary for so extraordinary an increase of the species, and that there had probably been no such conditions prevailing during the interval between the two outbreaks. When the season was dry the larvæ were much more free from fungi, of course.

Dr. Howard stated that the Norwegian officials had sent to the Division of Entomology, U. S. Department of Agriculture, for the locust *Sporotrichum*, as they wished to see if it could be used against the pine bombyx.

—Dr. Dyar reported some early dates for the hatching of mosquito eggs. Eggs of *Culex canadensis*, laid at Center Harbor, New Hampshire, last August, and kept by him over winter at Washington, had hatched on the 9th of March. Mr. J. Turner Brakeley, at Lahaway, New Jersey, had found larvæ of the same species, under the ice, some time in February.

—Speaking of mosquitoes, Mr. Banks reported that he had taken *Megarhinus portoricensis* at Washington last August, and Mr. Kotinsky reported having collected *M. rutilus* along Rock Creek, in the District of Columbia, during the past summer.

—Mr. Banks exhibited a nest of the purse-web spider (*Atypus abboti* Hentz) which he had found at Falls Church. The species is rare here, though known as far north as Massachusetts.

—Upon invitation, Dr. Holland gave an account of the insect collections in the Carnegie Museum in Pittsburg, and told of the work which was being done there and of that which was contemplated. In reply to a query he stated that the "Moth Book" which he was preparing would be published soon, and would contain illustrations of 1,800 different moths.

—Dr. Dyar then presented the following paper:

NEW NORTH AMERICAN LEPIDOPTERA WITH NOTES ON LARVÆ.

By HARRISON G. DYAR.

In Bulletin 52, U. S. National Museum, a few new forms were briefly characterized. It is proposed to give fuller descriptions of them here, together with certain notes that seem worthy of record.

Parnassius clodius Ménétries.
Variety **altaurus**, n. var.

Resembles typical *clodius*, except that the two colored spots on the hind wings are centered with pale ocher yellow instead of red.

Six examples of both sexes, Alturas Lake, near Saw-tooth Mt., Idaho, 7,000–9,000 feet, July 26, 1896 (T. B. Evermann).

Type.—No. 6769, U. S. National Museum.

Lepisesia vega, n. sp.

Grayish green, the type being faded the green color is largely lost. Fore wing with a distinct basal dark green band, limited outwardly by a pale line, as distinct as the median band and not present in any other *Lepisesia*. Median band more upright than in *gauræ* and *juanita*, wider on the costa and enclosing the discal dot as usual; a well marked apical green triangle, fading out on costal edge and a small triangle on inner margin just before the angle. Hind wing red, diluted yellowish beyond middle; marginal band black, not broad. Size and general appearance of *juanita*. Expanse, 55 mm.

One male, Las Vegas Hot Springs, New Mexico, August 12, 1901 (Schwarz and Barber).

Type.—No. 6770, U. S. National Museum.

Calidota zella, n. sp.

Head and thorax dark brown, pink scales at posterior edge of vertex and on patagia within. Abdomen pinkish red above, a dorsal series of small brown dots; a lateral brown band incised above; venter grayish white. Legs gray; anterior coxæ pink on the sides. Fore wing gray-brown, a little shining; a triangular discal dot, pale yellow; hind wing whitish, translucent. Expanse, 26 mm.

Two males, Hot Springs, Arizona, June 26 and 27 (Schwarz and Barber).

Type.—No. 6116, U. S. National Museum.

Schinia marginata Haworth.

Larvæ from Mr. O. Seifert, Long Island, New York.

Head rounded bilobed, free, erect; clypeus moderate; whitish on face, the sutures dark, lobes heavily reticulate in brown. Body normal, tubercle iv well above the spiracle on the posterior segments; feet equal. Dorsum nearly all brown from broad, obscurely double, dorsal, subdorsal, lateral and suprastigmatal bands, mottled with pale and separated by narrow pale spaces. A broad white stigmatal band, enclosing the black rimmed spiracles. Subventer faintly brown mottled; venter and feet pale. Setæ pale; tubercles moderate, the dorsal ones somewhat distinctly produced, brown ringed.

Food plant, *Ambrosia artemisiæfolia*.*

Hypsoropha monilis Fabricius.

Larvæ from Mr. O. Seifert, Island Grove, Florida.

Head small in proportion, rounded bilobed, erect; pale at the sides, a

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* Seifert, Journ. N. Y. Ent. Soc., x, p. 175, 1902.

large black spot on the face of each lobe just below apex and a smaller one below it on lateral angle. Body smooth, robust, normal; feet equal; segments coarsely annulate. Tubercle iv on joint 10 at the middle of the spiracle, on 11 nearly in line with v, on 12 below the middle of the spiracle. Dark sordid brown, sparsely dotted with white. The dots are mostly segregated in an irregular addorsal line and about a broad diffuse yellowish white subdorsal band and in the position of the obsolete substigmatal band Spiracles black; tubercles small, the dorsal ones white.

On persimmon (*Diospyros virginiana*), feeding at night, concealed on the ground by day.

Lepipolys perscripta Guenée.

Larvæ from Mr. O. Seifert, Island Grove, Florida.

Head rounded, oblique, not retracted; white, thickly dotted with angular black spots and streaks. Body cylindrical, even, normal; feet equal; tubercle iv at the top of the spiracle on posterior segments (joints 8 to 10). Olivaceous brown, tubercles black in large round brown plates. A series of conspicuous round dorsal white spots, two on each segment of the abdomen, the anterior one shorter and broader than the posterior one; on thorax divided into four spots, the third spot incised by tubercle ia and partly divided on the dorsal line. A large white square in place of the cervical shield containing four black tubercles. Anal shield white with black tubercles and dots. Stigmatal band broad, white, occasionally incised with brown at the annulet folds, containing tubercles iii and iv and the small black spiracle. Tubercles v and vi white ringed outside the large brown plates. Leg shields white with two black spots. Venter pale, but not white. Thoracic feet white, spotted with black tubercles.

Feeds on *Linaria canadensis* (Seifert).

Plusiodonta compressipalpis Guenée.

Larvæ from Mr. A. Hyatt Verrill, New Haven, Connecticut.

Egg. Shape of two-thirds of a sphere, base flattened; pale yellow, not shining, smooth, very obscurely roundedly reticulate, the reticulations arranged in vertical rows with the ribs a trace more distinct; finely reticulate at the vertex. The whole sculpturing is very faint, shadowy, resembling markings rather than definite raised work. Diameter, .6 mm.

Stage I. Head small, rounded bilobed, cordate, pointed bluntly at the mouth, erect; white, eye black, mouth brown; width, .3 mm. Body cylindrical, normal, joint 12 a trace enlarged, 13 abruptly rounded; feet of joints 7 and 8 entirely absent. Translucent whitish, food green; tubercles and setæ small, black, distinct, normal, vi absent; no shields whatever; feet pale like the body. Tubercles ia to iib of thorax separate; iii and v absent.

Stage II. Head rounded, slightly bilobed, median suture depressed, obliquely erect; not shining, pale greenish yellow, eye black, mouth brown; width, .5 mm. Body slender, elongate, feet absent on joints 7 and 8; segments obscurely annulate. Pale greenish, green from the food,

slightly shining, smooth. A round, black, lateral spot on segments 4 to 8. Tubercles and shields obsolete.

Stage III. Head .75 mm. Whitish, not shining, green tinted. Body slender, green, whitish subventrally, not shining; a broad smoky lateral shade, containing in its lower part round segmentary black spots on joints 4 to 9. No shields nor tubercles.

Stage IV. As in the previous stage, green, with black lateral line and spots. Width of head, 1.3 mm.

Stage V. Width of head, 1.9 mm. As previously described by me.*

Graphiphora oviducta Guenée.

The larva closely resembles that of *G. rufula* Grote,† but is darker, and the light patch on the cervical shield occupies only the posterior third, instead of two-thirds.

Egg. Spherical, the base scarcely flattened, slightly higher than wide. Waxy white; about 48 ribs, diminishing somewhat at the ends, mostly by becoming confluent in pairs at the terminal third, stopping at the micropyle, which is slightly depressed. Ribs low, closely beaded; no cross striæ. Shape a little irregular, the basal end often considerably obliquely flattened by the pressure of deposition. Diameter, .6 mm.

Stage I. Head .3 mm, slightly bilobed, shining, with cervical shield black. Body robust, large, rather sharply rounded posteriorly, joint 12 slightly bulbous; a small black anal plate. Body transparent, green from the food, faintly shaded with brown, more so posteriorly, the anterior end being slightly attenuated and greener. Tubercles very small, black, rounded, invisible to a low-power lens except on joint 12. Setæ small, obscure. Feet normal, short, the thoracic ones faintly blackish.

Stage II. Head .4 mm., rounded, shining black. Body Noctuiform, 12 slightly enlarged, all darkly blackish shaded. Shields and large tubercles black; setæ distinct, pale at tips.

Stage III. Head .6 mm., with shields and tubercles shining black. Body darkly sordid, with a greenish tint, brown shaded across the centers of the segments; short and robust; feet normal. Setæ distinct, blackish, tubercles large. There are traces of a broken whitish dorsal line, most distinct intersegmentally; joint 12 slightly enlarged, its tubercles i and ii in a square.

Stage IV. Head 1 mm., dark brown, shining, the apex under joint 2; cervical and anal plates black, the shield quadrate, with a pale transverse bar on the posterior edge. Body shagreened, dull black, greenish over the thorax, and paler subventrally; joint 12 slightly enlarged, with a subdorsal wedge-shaped dilution, the point directed posteriorly. Tubercles large, blackish or black; setæ coarse and distinct; iv is larger than the black spiracle, the seta situated above its middle. Faint traces of a wavy subdorsal line continuing the dilution of joint 12.

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* Proc. Ent. Soc. Wash., IV, p. 326, 1899.

† Proc. Ent. Soc. Wash., IV, p. 323, 1899.

Stage V. Head 1.3 mm., rounded, the apex in joint 2, shining brown-black, sutures and sides diluted in pale luteous. Cervical shield shining brown-black, uncut by any longitudinal line, but with a broad, pale luteous bar transversely on the posterior rim. Anal plate large, pale centrally, mottled with dusky, black at the lateral margins. Dorsal area edged by a rather broad, diffuse, pale pinkish band, scalloped outwardly at tubercle ii, inwardly at the incisure, broadest on joint 12 on the slight hump. Color dark gray-brown, not shining, the skin wrinkled shagreened. Color uniform in the dorsal space, elsewhere mottled and dotted in paler, yet the pale subdorsals seem the edges of a broad pale dorsal space, not yet defined. Tubercles large, black, polished, but wrinkly, flat; tubercle iv above the center of the spiracle. Setæ dark, rather stiff.

Stage VI. Head 2.5 mm., dark, shining, faintly obscurely dark reticulate on a luteous ground, areas about tubercles i and ii pale; setæ pale; stiff. Cervical shield black, the posterior third pinkish luteous, slightly mottled, contrasted; a faint bisecting line. Body slightly flattened, joint 12 scarcely enlarged. Dorsal space broadly pale, pinkish white, sordid mottled and streaked in purplish brown, a darker central shade. The space is widened on the segments where it becomes faintly ocherous. Sides purple brown, mottled and dotted in whitish. Subventer and venter sordid olivaceous. Anal plate broadly pinkish, black on the lateral edges. Tubercles large, black, polished, iv above the middle of the spiracle. Spiracles black; feet normal, short; foot plates black, small, anteriorly situated.

Larvæ from Center Harbor, New Hampshire. They fed on various low weeds, and hid persistently under rubbish.

Stretchia mys, n. sp.

Thorax with a sharp anterior carinate crest, with fore wings rich reddish purple, uniform, very slightly hoary sprinkled, and with traces of small, pale dots on the veins in the position of the transverse posterior line. No markings whatever. Outer margin scarcely crenulate, bent at vein 3. Hind wings whitish, strongly tinted with dull rosy, darkest along the outer margin and fringe. Abdomen dull reddish. Below the body is bright reddish, the wings pale, tinged with rosy about the margins. Expanse, 35 mm.

One male, Sonoma Co., California (A. Koebele, No. 587).

Type.—No. 6773, U. S. National Museum.

Perigonica tertia, n. sp.

Male antennæ strongly pectinated. Thorax and fore wings light ocherous clay color, marked like the most pronounced examples of *P. angulata* Smith. Subbasal, t. a. and t. p. lines double, blackish, crenulate, more or less broken and dotted; orbicular and reniform blackish filled, pale edged and faintly again with blackish; subterminal line light, edged within with a dark shade, twice bent, not very distinct; a terminal row of dots. Gen-

eral surface of wing sprinkled with dark atoms. Hind wings pale. Expanse, 37 mm.

Two males, one female. California (No. 5668, collection J. B. Smith, but apparently from Hy. Edwards' collection), Portland, Oregon, April 23 and May 11, 1892 (Dyar).

Type.—No. 6790, U. S. National Museum. The California specimen bears also the type No. 249, being recorded as one of the types of *fulminans*, on the strength of a label "*Perigonica fulminans* Smith, type," in Smith's handwriting. Nevertheless, this is an error, since the only type locality given is Colorado.*

Homopyralis monodia, n. sp.

Ground color uniform blackish, slightly violaceous, without the ocherous dilutions of the other species of the genus. Ordinary spots black, illy contrasted, a dash of the same color beyond the cell. Lines fine, black, narrowly edged with white scales, appearing broken and powdery, finely dentate, consisting of subbasal, t. a., t. p. and subterminal lines, the t. a. and t. p. rather remote. Hind wings similar, less distinctly marked, a double white bar resting on anal angle as in the other species. Expanse, 21 to 23 mm.

"20 10 82" (collection, J. B. Smith); "21 10 82" (collection, C. V. Riley); Rosslyn, Virginia (A. N. Caudell); Cocoanut Grove, Florida (E. A. Schwarz).

Type.—No. 6791, U. S. National Museum.

Mr. Caudell has prepared a larva from Rosslyn, Va., found "under a log," July 22, 1899. Moth issued August 14, 1899.

Larva. Head rounded, slightly bilobed, flattened before, erect; antennæ rather large, pale, mouth prominent; brown, not shining, with small pale yellowish flecks, a larger pair of these on the face of the lobes above clypeus and another below, indicating a transverse band. Body cylindrical, moderately slender, feet of joints 7 and 8 absent. Tubercles produced, the dorsal ones, more especially ii, papillose; tubercle iv above the center of the spiracle. Dark brown with many longitudinal lines, irregularly geminate and confluent, dotted, so as to form a coarse reticulum; spiracles in a small deep black area; venter diffusely pale; a row of small dorsal black spots in the intervals of the gemination of the dorsal line. Tubercle i marked with black before and behind, the other tubercles yellowish white. Shields reduced, lumpy tubercular, the cervical shield blackish. Setæ large and coarse, blackish. Thoracic feet pale, shaded with smoky brown.

Platythyris oculatana Clemens.

Larvæ from Mr. Henry Engel, Pittsburg, Pennsylvania.

Larva. Head rounded, circular, disk shaped, not bilobed; clypeus extremely narrow, only a little broader at base than near vertex, upper third enlarged angularly by a projection of the paraclypeal pieces, the clypeus

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* Ent. Amer., VI, p. 125, 1890.

itself very narrowly high triangular, yet not reaching over two-thirds to the vertex; antennæ rudimentary, mouth small, yet with well developed spinneret; shining black, outer sutures of paraclypeus and median suture orange; antennal bases white; width 2.5 mm. Body cylindrical, robust, tapering only at the extreme ends, joint 12 a little enlarged dorsally. Feet normal, all short, the abdominal ones almost sessile, the crochets in a complete circle. Skin smooth, subtranslucent orange colored, joint 2 appearing unmarked. Cervical shield large, not well cornified, dark orange, narrowly bisected dorsally, complete; prespiracular and subventral tubercles of joint 2 orange, a little black shaded. Dorsal tubercles i to iii large, convex, smooth with the edges radially striate, shining black; anal plate black; subventral tubercles orange. On the thorax tubercles ia + ib, iia + iib, iv + v; a small black shield on joint 3 dorsally posteriorly, narrowly divided on dorsal line. On abdomen tubercle i well dorsad to ii, iv + v on a single round tubercle, vi normal, vii represented by three hairs on the leg base in a triangle.

Lives in a rolled-up leaf on *Eupatorium ageratoides*. This larva, the first larva of the family Thyrididæ to come to my notice, shows that family to be correctly referred to the Tineoidea, near the Pyralidæ.

Platyptilia marmarodactyla, n. sp.

Stone gray, with a bright pinkish ochraceous mark at base of first feather. Fore wing gray, shading to reddish along inner margin, with irregular tufts of black scales along the edge; a rounded triangular, pinkish ocherous patch, resting on the fissure at base of first feather and narrowly touching costa, preceded by a transverse black bar before the fissure; a subterminal white line on both feathers. Hind wing gray, with an irregular row of spathulate scales on the margin of third feather. Expanse, 15.5 to 17 mm.

Seven specimens: Los Angeles Co., California, April (A. Koebele); Las Vegas Hot Springs, New Mexico, August 8, 15 and 18 (Schwarz and Barber); Santa Rita Mountains, Arizona (E. A. Schwarz).

Type.—No. 6792, U. S. National Museum.

The three Californian specimens have been submitted to Lord Walsingham in 1887, and to Prof. Fernald at a later date. The former endorsed them "*Amblyptilia*, near *cosmodactyla* Hübn.," and the latter "I do not feel prepared to separate this from *P. cosmodactyla* H." I think, however, that the species is distinct from *cosmodactyla*.

Œnectra puritana Robinson.

Larvæ collected by Dyar and Caudell at Golden, Colorado.

We sent a mass of leaves webbed by Tortricid larvæ from Colorado to Washington, D. C., where they were cared for by Mr. Busck. The plant was *Pulsatilla hirsutissima*, and the

larvæ were thought to be of one species. But three kinds emerged in Mr. Busck's hands, the present species, *Lophoderus coloradana* Fernald* and the following species. I therefore content myself with the record of the food plant.

Eucosma pulsatillana, n. sp.

Near *improbana* Walker and *radicana* Walsingham and the gray form of *nisella* Clerck. Fore wings moderately elongate, costa strongly arched; gray, irrorate with black. Basal space broadly dark as in *nisella*, the outwardly limiting line bowed outward a little at the middle, slightly oblique, so that the space is broader on internal margin than on costa, coarsely irrorate with black. A dark gray bar, limited by irregular black scales, starts from the middle of the costa and bends outward to the middle of the disk, narrowly, but sharply and squarely separated from a similar short, curved bar arising from the anal angle; a dark costal dash throws a waved, irregular line obliquely to above anal angle; three costal dashes beyond this, the outermost largest and reaching opposite the middle of margin; a terminal black band, wide centrally; fringe gray, irrorate in black. In some specimens the lower part of the basal space and the bar at the anal angle are shaded with ocherous. Hind wing light silky grayish. Expanse, 15 to 17 mm.

Twenty males and eight females bred from larvæ found webbing the leaves of *Pulsatilla hirsutissima* high on the foothills at Boulder and Golden, Colorado.

Type.—No. 6768, U. S. National Museum.

Eucosma cercocarpana, n. sp.

Veins 3 to 5 of fore wings are converged toward a marginal incision. The wings are elongate and narrow, costa convex, inner margin concave before the anal angle. Markings closely as in *improbana* Walker, but the median band is more oblique and there is a dark marking subapically.

Dark gray, the lighter parts of fore wings with shining, slightly raised scales. A large dark basal space, sharply limited outwardly and with a central angle, is irrorate with black scales on a dull olivaceous brown ground. Beyond the ground is cinereous, irrorated with olivaceous. An oblique bar from near basal third of costa to before anal angle is cut by a longitudinal black dash which causes a projection on each side, the inner one nearly or quite touching the projection of the basal patch; another projection from the bar on its outer side near inner margin extends nearly perpendicularly upward. Beyond and above the black bar is a second less evident one, situated in the upper part of an olive brown cloud subapically. A small black apical dash with olivaceous brown below on fringe. A row of small, oblique, costal bars. Fringe dark gray on lower two-thirds of termen. Hind wing brownish gray, darker outwardly. Expanse, 15 to 18 mm.

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* See Proc. U. S. Nat. Mus., xxv, p. 402, 1902, for note on larva.

Three males, one female, Platte Canyon, Colorado, bred from larvæ on *Cercocarpus parvifolius*, where they occurred in small proportion mixed with the dominant *Teras foliana* Walsingham. The larvæ were not differentiated.

Type.—No. 6771, U. S. National Museum.

Mieza psammitis Zeller.

Larvæ from Mr. A. N. Caudell, Victoria, Texas.

Larva. Head rounded bilobed, clypeus broad, rather high; pale testaceous, clypeus brownish with brown sutures and a white streak on each side; retracted in joint 2, which in turn is partly retracted in joint 3. Body a little narrowed at the ends, robust, flattened, shaped much as in the Cochlidiidæ, but less elliptical; feet normal, weak, the planta with a single row of small tufted crochets. A round, eversible area just below the spiracle on joints 5 to 12 projects prominently in the inflated specimens. Pale green, with longitudinal yellowish white lines, obsolete on the anterior retracted segments. They are addorsal (i), two subdorsal, the upper (ii) broadest, lateral, suprastigmatal, broken into spots, two subventral, enclosing the eversible area, the lower one much broken, and scattered dots indicating two more lines above the feet. Feet all pale; spiracles small, circular, brown ringed. Tubercles small and obscure, with single setæ; i nearly directly dorsad to ii, whitish, slightly elevated, iii close to the spiracle and above it, iv and v below the eversible area, separate, iv dorsad to v by the diameter of a tubercle, vi subventral basally, vii on the leg base; no secondary setæ apparent. Skin finely granular shagreened.

Cocoon elliptical, brown, rather hard, much as in *Mieza igninix* Walker.

Lives on *Bumelia lanuginosa.**

—Mr. Currie read the following paper:

THE ODONATA COLLECTED BY MESSRS. SCHWARZ AND BARBER IN ARIZONA AND NEW MEXICO.

By Rolla P. Currie.

A list of the dragonflies collected in Arizona and New Mexico during the summer of 1901 by Messrs. E. A. Schwarz and H. S. Barber is of sufficient interest to merit publication. Collecting operations extended from the last week in May till the middle of August, and 172 specimens were secured, representing 24 species and two varieties. Of this number one species, an *Ischnura*, is here described as new and named in honor of Mr. Barber who

*Proc. Ent. Soc. Wash., v, p. 127, 1903; compare Journ. N. Y. Ent. Soc., IV, p. 87, 1896.

devoted special attention to securing these insects. It may be well, by way of introduction, to give a brief account of the localities visited, as Mr. Schwarz and Mr. Barber have described them to me.

The last week in May and the first two weeks in June were spent at Williams, as well as the last of June and several days in July before and after visiting the Grand Canyon. Here a small stream flowing down from Bill Williams Mountain had been dammed in several places to furnish water for the saw-mill; thus a number of good sized ponds or small lakes had been made, and along the shores of these, and of another pond on a small stream about a quarter of a mile distant, the dragonflies were taken. Mr. Barber tells me that these streams had dried up before he left Williams, leaving water in the ponds only. The altitude of Williams is about 6700 feet.

Flagstaff, with an elevation of 6,940 feet, had a permanent supply of running water. Otherwise the country was much like that of Williams. Here about a week was spent and Odonata were collected along an open sewer of running water, and also at a reservoir situated about three miles from the town.

At Ashfork the country was extremely dry everywhere and the only water to be found was a small pond of waste from the railway engine tank, although the dry bed of a creek indicated that there had been water there at one time. This place has an elevation about 1,000 feet less than that of Williams.

Hot Springs, in Yavapai County, about fifty miles north of Phœnix, proved a most interesting collecting ground, and many new and rare species in various groups of insects were captured here. At this place the new species of *Ischnura* was found. In the "four tanks," a succession of large water-filled pot-holes in the rocks, a number of interesting dragonfly larvæ were obtained, while adults of various species were flying over a small stream fed by the hot springs. Near the hotel were several fountains of tepid water piped from the springs, and around these all the specimens of *Telebasis salva* were taken, while *Argia violacea*, variety *pallens*, occurred along a sewer leading from the buildings. The altitude of Hot Springs is about 2,300 feet.

Within the Grand Canyon nearly all the specimens were collected along a spring-fed stream, about a foot and a half wide and six inches deep, lined on either side by willows and tall, coarse grass. The spring is situated about 4,000 feet below the brink of the canyon and some 2,000 feet above the river. Mr. Barber descended the canyon to this point on two successive days for the purpose of making collections. Here, among other species, he found the Mexican *Hetærina vulnerata* and *Cordulegaster diadema*.

Mr. Schwarz tells me that swallows and dragonflies are the

only winged creatures he saw flying down into the canyon. Butterflies and other insects, and birds other than swallows, would turn back upon reaching the brink as if afraid to venture further. As there is no water around the Bright Angel Hotel or anywhere in its vicinity, and none below the brink till one comes to the spring just mentioned, it appears that the species captured at the brink (*Argia moesta*, *Herpetogomphus compositus* and *Sympetrum corruptum*) must have come up from the spring, or, in other words, ascended from the Lower Sonoran zone to the Transition zone. It is noteworthy, however, that these are all species which have a wide geographical distribution not confined to any one zone; no exclusively Lower Sonoran species was seen to ascend to the brink of the canyon or was found above its normal habitat. The elevation above sea level of the Bright Angel Hotel, on the brink of the canyon, is about the same as that of Williams.

At Winslow most of the species were obtained along an irrigation ditch full of clear, swiftly-running water, although a few were taken over a very muddy, stagnant branch of the Little Colorado river. Winslow's elevation is very much less than that of Williams, probably about 5,400 feet.

Las Vegas Hot Springs, New Mexico (altitude 6800 feet) was the last locality visited. Here the first two weeks of August were passed, collections being made along the Gallinas river, and here, among other species, *Hyponeura lugens* and *Argia vivida*, variety *plana*, occurred.

The following list includes all the adults taken. The nymphs were submitted for study to Dr. James G. Needham. I am indebted to Dr. Philip P. Calvert for obligingly going over and verifying my determinations and helping me in many other ways. The bibliographic references to the species are not given here but may be found—for the Zygoptera, in the Odonata part of the Biologia Centrali-Americana, and for the Anisoptera, in Kirby's "Synonymic Catalogue of Neuroptera Odonata or Dragonflies."

Hetærina vulnerata Selys.

Bright Angel, Colorado Canyon, 2700 feet, July 12 (6 ♂♂), July 13 (4 adult and 4 teneral ♂♂, 7 ♀♀).

Hyponeura lugens (Hagen).

Las Vegas Hot Springs, New Mexico, August 11 (1 ♂), August 9 (1 ♀).

Argia moesta (Hagen).

Bright Angel [Hotel], July 11 (1 ♂), July 10 (1 ♀); Bright Angel, Colorado Canyon, 2,700 feet, July 12 (6 ♀♀), July 13 (3 ♀♀); Williams, June 30 (1 ♀); Hot Springs, June 23 (1 ♀), June 24 (1 ♀).

Argia vivida Selys.
Bright Angel, Colorado Canyon, 2,700 feet, July 12 (12 adult and 3 teneral ♂♂, 1 pair in copula, 4 adult and 6 teneral ♀♀), July 13 (6 adult and 1 teneral ♂, 4 pairs in copula, 4 adult and 5 teneral ♀♀).

Argia vivida Selys, variety **plana** Calvert.
Las Vegas Hot Springs, New Mexico, August 3 (2 ♂♂), August 9 (1 ♂).

Argia violacea (Hagen).
Bright Angel, Colorado Canyon, 2,700 feet, July 13 (1 ♂, 1 ♀), July 12 (1 ♀).

Argia violacea (Hagen), variety **pallens** Calvert.
Hot Springs, June 23 (1♂), June 24 (6 ♂♂, 1 ♀) June 25 (1 ♂), June 26 (1 ♂).

Argia agrioides Calvert.
Hot Springs, June 22 (1 adult and 1 teneral ♂, 1 ♀), June 23 (3 adult and 1 teneral♂, 3 ♀♀), June 24 (1 adult and 2 teneral ♂♂, 1♀), June 25 (4♂♂, 2 ♀♀, 1 pair in copula), June 26 (3 adult and 2 teneral ♂♂, 1 ♀), June 28 (1 ♀); Las Vegas Hot Spring, New Mexico, August 7 (1 ♂).

Enallagma civile (Hagen).
Williams, June 1 (1 ♂); Winslow, July 31 (1 ♂).

Enallagma carunculatum Morse.
Winslow, July 31 (2 ♂♂).
One ♀ from Williams, May 27, and 1 ♀ from Winslow, July 31, are either *civile* or this species. No character has yet been discovered for separating the ♀♀ of these two Enallagmas.

Enallagma praevarum (Hagen).
Williams, June 1 (1 ♂, 1 pair in copula), June 6 (1 ♂), June 15 (3 ♂♂, 1 ♀), June 30 (1 ♂), July 15 (1 ♀); Winslow, July 31 (1 ♂, 4 ♀♀), Las Vegas Hot Springs, New Mexico, August 2 (1 ♀).

Telebasis salva (Hagen).
Hot Springs, June 23 (9 ♂♂, 1 ♀).

Ischnura damula Calvert.
Flagstaff, July 4 (1 ♂).

Ischnura demorsa (Hagen).
Williams, June 6 (1 ♂), June 15 (1 ♂); Flagstaff, July 4 (1 ♂. 1 black ♀).

FIG. 6.—*Ischnura damula*, profile view of 10th abdominal segment and appendages of ♂. × 24.

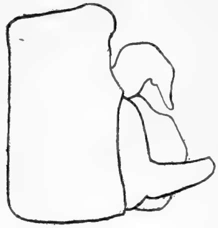

FIG. 7.—*Ischnura barberi* n. sp., profile view of 10th abdominal segment and appendages of ♂. × 24.

Ischnura barberi, n. sp.

♂.—Metallic black, the following blue, green or yellowish; lips (except a transverse basal stripe on labrum), rhinarium, frons, genæ, head below, an isolated round postocular spot each side, margins of prothorax, sides of meso- and metathorax (except a short superior line on first lateral suture and a long one on the second), an antehumeral stripe each side and a transversely oblique line each side, behind or above them, pectus, feet (except a superior stripe on femora and tibiæ and extreme apex of tarsal joints), 1 (except a basal spot on dorsum), sides and venter of 2–7, all of 8 and 9, 10 (except dorsum). A transverse, basal, interrupted yellow ring on 3–7. Dark band on 2 narrowed apically, that on 3–6 widened on apical fourth, constricted just before it, much less constricted on 6.

Forked elevation on 10 not much more than half as high as 10, rising at a gradual slope and in a straight line from the base of the segment; forked in less than its apical half; branches forming an angle of about 90°. Superior appendages short, rather stout, about one-half as long as 10, tubercular, with a pointed, inferior, apical process, which is hardly longer than the other part of the appendage. Inferior appendages nearly as long as 10, yellowish except at tip, broad at base, the outer side prolonged as a process the tip of which is acute and curved inwards; inner side also prolonged into a broad, flattened, rounded, shorter process, thus making the appendage bifid.

Wings clear. Fore wings with eight postcubitals in first series. Nodal sector arising between the third and fourth (nearer the fourth) postcubital on fore wings, near third on hind wings (on left wing *at* the third, on right wing between second and third, on this specimen). Pterostigma on front wings surmounting a little less than one cell, longer than wide, outer side straight; blackish, the outer corner pale; on hind wings paler.

Abdomen 24.5, hind wing 15.5 mm.

Hot Springs, June 24 (1 ♂).

Type.—No. 6891, U. S. National Museum.

This species is very similar to *Ischnura denticollis* Burmeister

(*exstriata* Calvert), but is larger, possesses an antehumeral stripe, is without black markings on 8 and 9, the appendages are stouter and are longer in proportion to the length of the last segment, while the inferior process of the superiors is shorter. The inner prolongation of the inferior appendages seems to be a peculiarity of this species.

Progomphus obscurus (Rambur).
Bright Angel, Colorado Canyon, 2,700 feet, July 12 (1 ♂).

Ophiogomphus severus Hagen.
Las Vegas Hot Springs, New Mexico, August 3 (1 ♂).

I had first determined this, from the description and figure, as *O. occidentis*, but Dr. Calvert, when I was in Philadelphia last winter, corrected the determination and showed me types of both species for comparison.

Herpetogomphus compositus (Hagen).
Bright Angel, Colorado Canyon, 2,700 feet, July 12 (1 ♂), July 13 (2 ♂♂, 2 ♀♀); Bright Angel [Hotel], July 10 (1 ♀); Bright Angel, 6,800 feet, July 13 (1 ♂).

Cordulegaster diadema (Selys).
Bright Angel, Colorado Canyon, 2700 feet, July 13, in stream in "Willows" (1 teneral ♀).

A cast skin, probably of this species, was taken on a rock near the place where the imago was captured. I think the species has not previously been recorded from the United States.

Æschna multicolor Hagen.
Winslow, July 31 (1 ♂); Williams, July (1 ♂ fragment—five terminal abdominal segments and appendages).

Anax junius (Drury).
Winslow, July 31 (1 ♂, 1 pair in copula).

Pantala hymenæa (Say).
Hot Springs, June 25, "laying eggs in fountain" (1 ♀).

Libellula saturata Uhler.
Williams, June 3 (1 ♂), June 15 (1 ♂), July — (2 ♂♂); Hot Springs, June 23 (1 ♂); Bright Angel, Colorado Canyon, 2,700 feet, July 12 (1 ♀), July 13 (2 ♂♂, 1 ♀).

Sympetrum corruptum (Hagen).
Williams, June 1 (6 ♂♂), June 2 (2 ♂♂), June 5 (1 ♀), June 6 (3 ♂♂), June 30 (1 ♂), July 3 (2 ♂♂), July 16 (1 ♀); Flagstaff, July 4 (1 ♂); Ashfork, June 18 (1 ♀); Bright Angel [Hotel], July 11 (2 ♀♀); Bright Angel, Colorado Canyon, 2,700 feet, July 12 (1 ♀); Winslow, July 31 (5 ♂♂, 2 ♀♀).

Mesothemis simplicicollis (Say), variety **collocata** Hagen.
Winslow, July 31 (1 ♂).

Specimens of the most interesting species were shown.

The paper was discussed by several of the members. Mr. Banks said that it could hardly be true that dragonflies and swallows are the only winged creatures which venture over the brink of the canyon for these were undoubtedly in pursuit of their accustomed prey—small flies, gnats, etc.

—Under the title "Some remarks on Japanese Hymenoptera," Mr. Ashmead showed a number of interesting species from Japan and commented upon them. The National Museum, he said, has now quiet a representation of Japanese insects. The first accession of importance was the collection received from the World's Fair at Chicago, through Mr. Mitsukuri, of the Imperial University of Tokyo. Since then a number of smaller collections had come in from various sources. Of the Hymenoptera in the collection the Aculeata belonged mostly to species already described, but in the Parasitica probably 150 new species and several new genera were represented. There were, he judged, in the neighborhood of 500 described species of Japanese Hymenoptera. He alluded to the wide distribution of certain Japanese bees, some species of which were found as far south as India.

Following the paper, Messrs. Howard, Holland, Pollard, Gill, and Marlatt discussed the zoo-geographical conditions prevailing in the Japanese islands, not only as shown by the insects but by the fishes and plants.

April 2, 1903.

The 177th regular meeting was held at the residence of Mr. William H. Ashmead, 1807 Belmont avenue, N. W., Vice-President Banks in the chair, and Messrs. Ashmead, Barber, Busck, Currie, Doolittle, Dyar, Gill, Heidemann, Hopkins, Howard, Kotinsky, Marlatt, Patten, Simpson, Warner, Webb, Uhler and Ulke, members, and Mr. H. Bolce, visitor, also present.

Mr. Banks reported that 11 members attended the field excursion to Bladensburg, Maryland, on March 26. A most enjoyable day was experienced and some good entomological finds made.

—Dr. Dyar presented the following note:

A NOTE ON PYRAUSTA OCHOSALIS FITCH, MS.

By Harrison G. Dyar.

Fitch's specimen (No. 406) has been in the National Museum collection under *Pyrausta generosa* G. & R., but it differs obviously from that species. The yellow spot without the t.-p. line on the costa is very small, and there is a larger one within the line filling its outward bend at the end of the cell. The yellow spot between the reniform and orbicular is very small, usually absent. The species is also smaller. It closely resembles the European *Pyrausta aurata* Scop., having all the same markings, but the yellow band on hind wings is more outwardly placed and less diminished costally in the American than in the European form. Our specimens are from:

[New York] (Fitch collection, 406 and 6580); New York (H. S. Burnett); Chicago, Ill. (A. Kwiat); Taoz, New Mexico, June 14, 1875 (Wheeler survey); Rio Ruidoso, White Mountains, New Mexico, July 31 and August 1 (C. H. T. Townsend). Also a specimen with the band on hind wings narrower and whitish from " top of range, June 26" [New Mexico] (T. D. A. Cockerell).

—Dr. Dyar showed a living larva of *Hemileuca electra* Wright, sent for inspection by Mr. O. C. Poling. The species lives in Southern California and is among our rarest Saturnians. A description of the larva has been published by Mr. Coquillett (Journ. N. Y. Ent. Soc., VI, p. 250, 1898). The specimen shown looks very like a larva of *Pseudohazis* except for the gray cast that the white dots on the secondary hairs give. The upper row of warts has a short shaft on joints 4–12 (single on joint 12), the spines arising in a bunch. The other warts are in the form of long branching spines. The white subdorsal and lateral lines are straight, the substigmatal one waved. There are no spines on the anal plate, though it is hairy. There is an unpaired long dorsal spine on joint 13.

—Dr. Dyar presented also the description of a Tortricid constituting a new genus and species, *Phthinolophus indentanus*, as follows:

NOTE ON A WRONGLY IDENTIFIED SPECIES OF TORTRICIDÆ.

(*Phthinolophus indentanus*, n. gen. and sp.)

By Harrison G. Dyar.

Two years ago I described* the larva of *Cerorrhineta*† *calidana* Zeller, identified by Prof. Fernald with a query, the larvæ on *Eugenia* from Florida. Another specimen in the collection of Mr. Philip Laurent, of Philadelphia, collected at Mt. Airy, Pennsylvania, bears Prof. Fernald's label, in his own handwriting, this time without the query. Mr. Laurent has other specimens from Anglesea, New Jersey, and I have a series bred on wax myrtle (*Myrica cerifera*) at the Department of Agriculture under the number 3422, June, 1884, from Fortress Monroe, Virginia. In all 41 specimens are before me. The *Myrica* specimens were submitted to Lord Walsingham in 1884 and labelled "*Pædisca*, n. sp." Prof. Fernald has a specimen sent him in 1898 and still unreported upon except to the effect that it was not the Florida species. In my opinion, however, there is but a single species before me, and that with but a small range of variation.

I feel reluctantly compelled to dissent from Prof. Fernald's determination. Zeller described *Cerorrhineta*‡ as "Die erste bekannte Wicklergattung in welcher die männlichen Fühler, wie bei *Pempelia* und *Nephopteryx*, doch ohne Krümmung der Geissel, durch rauhe Schuppen zu einem länglichen Knoten verdickt sind," and "Beim ♂ der ganze Vorderrand bis nahe an die Spitze zurückgeschlagen ist." In the specimens before me there is no knot-like thickening of the ♂ antennæ as in *Nephopteryx*, but a long, slight thickening with a notch near its end as in *Tmetocera*. The ♂ costal fold does not reach over half the length of the costal margin. In the specific description of *calidana*, Zeller does not describe any of the characteristic markings of the specimens before me. If further proof were needed, Walsingham's discussion and figure of the venation§ show a very different insect, belonging to the Tortricinæ and allied to *Capua*, whereas the form before me belongs to the Olethreutinæ near *Tmetocera*.

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* Proc. Ent. Soc. Wash., IV, p. 468, 1901.

† Written *Cerorrhincta* by a typographical error.

‡ Hor. Ent. Soc. Ross., XIII, p. 116, 1877.

§ Proc. Zool. Soc. Lond., 1891, p. 499, Pl. XLI, fig. 2, where he changed the name to *Ceratorrhineta*, inadmissibly, I believe, and Proc. Zool. Soc. Lond., 1897, 133.

Phthinolophus, n. gen.

♂ antennæ simple, an elliptical thickening at base above with a notch at the outer portion. Fore wing with a broad costal fold on basal half containing a tuft of pale hairs. Wings moderately elongate, costa convex. Fore wings with all the veins from the cell, 4 curved, narrowly separated from 5 at base. Hind wing with veins 3 and 4 stalked, 5 arising close to the base of the stalk, curved; 6 and 7 closely approximate. Thorax smooth, head with a low keeled crest. Palpi porrect, second joint broadly tufted, third bare. In the unset specimens an erect tuft of scales projects triangularly upward above the basal third of inner margin, which is lost in the set specimens.

Phthinolophus indentanus, n. sp.

♂ with the costal two-thirds of fore wing dark blackish brown, yellowish and brighter at apex where a row of dark costal strigæ are visible, but a dark band again succeeds, running obliquely from the apex. Inner third light gray, incising the brown at basal and outer thirds; a few brown strigæ on inner margin and a double row of two short brown bars in a yellowish field in the position of the ocelloid patch, the inner pair sometimes forming a distinct brown spot. The tuft seen in the unset specimens is in the basal projection of the gray area. Hind wing gray. Expanse, 12 to 14 mm.

♀ lighter colored, the costal two-thirds largely ocherous, streaked with brown, its lower edge marked with dark brown bars in a broken row from below cell to apex. Inner margin gray, incising the ocherous color; ocelloid patch as in the ♂, ocherous, cut vertically by gray, but showing three brown bars in two series, the inner series forming a distinct brown spot. Expanse, 14 to 15 mm.

17 ♂♂, 21 ♀♀; Palm Beach, Florida (Dyar); Fortress Monroe, Virginia (U. S. Dept. Agriculture); Mt. Airy, Pennsylvania, and Anglesea, New Jersey (Laurent); Montclair, N. J. (Kearfott); Hastings, Fla. (Kearfott).

Type.—No. 6804, U. S. National Museum.

—Mr. Ashmead exhibited an interesting new genus and species of wasp, described in the following paper:

MYRMECOSALIUS, A NEW GENUS IN THE CEROPALIDÆ.

By William H. Ashmead.

Apterous and subapterous Ceropalidæ are rare, there being only three or four species known, so that the species described below, which represents a new genus in the subfamily *Pepsinæ*, is of great interest. It was discovered by Dr. William M.

Wheeler, in Texas, living in the nest of the harvesting ant, *Pogonomyrmex barbatus* Smith, and was sent to me some months ago. It may be predaceous upon some of the curious arachnids living in ant nests in Texas.

Myrmecosalius, n. gen.

♀.—Wings rudimentary, narrowed, not quite reaching to the metathoracic spiracles, and with only two basal cells, the stigma, radial, cubital and discoidal cells being wholly absent; head, legs, and abdomen as in *Salius* (*Priocnemis*); thorax narrowed, the prothorax only two-thirds as wide as the head, the mesothorax contracted, the mesonotum being rather small, shorter, and much narrower than the pronotum; the scutellum is small, rounded behind, the postscutellum hardly one-third the length of the scutellum; metathorax longer than wide, convexly rounded, the spiracles linear. ♂ unknown.

Myrmecosalius nigriceps, n. sp.

♀.—Length, 5.5 to 6 mm. Head, except the clypeus, the mandibles, and the palpi, and the antennæ, except the first three joints, which are brownish-yellow, black; the clypeus, mandibles, thorax, legs, and the abdomen, except the pygium and the hypopygium which are black, wholly ferruginous. The head is finely, closely punctulate, opaque, the thorax finely, microscopically shagreened, while the abdomen is smooth, shining, although under a strong lens it is seen to be microscopically shagreened and finely sericeous or downy.

Type.—No. 6820, U. S. National Museum.

—Dr. Howard referred to a recent paper by Mr. Charles T. Brues in the *Biological Bulletin* on the messmates of ants of the genus *Eciton*. Among the species treated in this paper as found in these ants' nests were some Proctotrypoids belonging to new species in the Ceraphronidæ, and a *Telenomus*. It was noteworthy, he said, that no aphids nor coccids were found in the nests, but a large number of flies of the family Phoridæ. The Ceraphronids were probably parasitic upon the Phorid larvæ, but what did the *Telenomus* parasitize? Dr. Howard thought they possibly attacked the ants' eggs.

Mr. Ashmead said he thought they might be parasitic on spiders' eggs, as spiders had been found in some of the ants' nests.

—Mr. Warner showed a hymenopterous parasite belonging to the Proctotrypoid genus *Scelio*, stating that he had found it attached by its mandibles between the base of the wing and the

hind legs of a specimen of grasshopper, *Dichromorpha viridis* Scudder, in the National Museum collection.

Mr. Ashmead remarked that the members of the genus *Scelio* were parasitic on the eggs of grasshoppers, and that it was the habit of the female to attach itself to the gravid female grasshopper and wait for the latter to deposit its eggs.

Mr. Banks stated that Dr. David Sharp, in the Cambridge Natural History, records a specimen of *Podagrion* found on a female Mantid, the members of this genus being parasites of mantis' eggs.

—Dr. Hopkins reported some observations made upon a recent trip to North Carolina. At Asheville he found twigs of pine thickly covered with dipterous galls. These galls were in the bark, and formed pits in the wood. The larvæ, covered with resin, were crawling out of the galls on to the bark and needles. He noticed that this resin covering the larvæ was the external substance used in forming the cocoons, and also served to attach the cocoon securely to the twig. Ratzeburg had described the cocoon, but not the gall, and it appeared that the latter had never been described. It probably belonged to some species of *Diplosis*, according to Mr. Coquillett. Some of the larvæ did not come out, but remained in the galls to pupate.

Dr. Hopkins reported, also, that in the swamps of North Carolina many of the cypresses which are girdled by the lumbermen, and left standing a year before being cut down, were considerably damaged by ambrosia beetles. He found that the presence or absence of this infestation depended upon the time of year when the girdling was done. Sweet-gum and black-gum trees were girdled in a similar manner, and were subject to the same attacks by the beetles. He found many interesting insects on these girdled trees.

Dr. Howard said he considered Dr. Hopkins' observations of special interest as having a bearing on the question of the oviposition of *Diplosis resinicola*. He thought the latter species might lay its eggs on the bark and not in the resin as has been supposed. He said that Packard considered the needle gall as a different species from the twig gall, and described it as *Diplosis pini-rigidæ*.

—Mr. Heidemann exhibited a specimen of the Aradid bug

Neuroctenus pseudonemus Bergroth, collected at Bladensburg, Maryland, on March 26, under bark. The species was described originally from "Carolina," and has not before been recorded from the District of Columbia. He showed, also, a specimen of *Neuroctenus simplex* Say, the species found commonly around Washington. *N. pseudonemus* is much the larger of the two forms.

Prof. Uhler remarked that this species is very large for our fauna, and has an almost tropical appearance. In the tropics some species of Aradidæ attain a length of about three quarters of an inch. He mentioned a species described by Champion from Central America, which lives under fungi, and bears little knob-like protuberances on its pronotum. These serve to scrape off and distribute over the back a powdery material from the fungus, giving the bug a spotted appearance not natural to it.

—Mr. Banks showed a specimen of a large Syrphid fly (*Ceria willistonii* Kahl), and presented the following note:

NOTE ON CERIA WILLISTONII KAHL.

By Nathan Banks.

From a puparium collected on oak bark at Falls Church, Virginia, about the middle of March, there issued on the 27th of March a fly of this species, previously known from Florida, Texas, and Kansas. The fly has a great resemblance to certain conopids, and also to some wasps. It is probably identical with *C. signifera* Loew from Mexico. The larva of *Ceria* is supposed to feed in the flowing sap of trees. I give below a short description of the puparium:

Puparium dull black above, whitish below, in front with two large white marks separated by a narrow black spot; anal tube shining black. Dorsum faintly mottled with pale, more prominent on the sides. Dorsum with a median row of double pointed tubercles, and a lateral row each side; those toward the tip are smaller than the others. Length, 18 mm.

—Mr. Banks showed, also, two rare Ortalid flies. The first bears a very close resemblance to an ant, as its name, *Myrmecomyia myrmecoides* Loew, would indicate. The other species, *Odontomera ferruginea* Macquart, also looks much like an ant, though the resemblance is not so striking. The latter was from the District of Columbia.

—Dr. Howard stated that while the conclusions of the U. S. Army Commission on the subject of yellow fever were very generally accepted by the physicians of Central and South America, no corroborative experiments have been made until very recently. Much general incredulity has been felt in Brazil, but in a letter just received from Dr. Adolpho Lutz, of Sao Paulo, an account is given of experiments in which there were three positive results, the mosquitoes having been captured in an uninfected place, taken to the city, allowed to bite yellow fever patients and then carried to an uninfected place and allowed to bite non-immunes. These experiments have been accepted as conclusive and Brazilian incredulity has been removed.

—Prof. Uhler mentioned the fact that mosquitoes had been introduced at Buena Vista, in the mountains of western Maryland, by transportation in freight cars, and that they were now breeding abundantly in an ice pond which has been made there.

—Dr. Dyar then read portions of a systematic paper submitted for publication by Prof. John B. Smith. The paper is as follows:

A REVISION OF THE BOREAL-AMERICAN SPECIES OF NONAGRIA Ochs.

By John B. Smith, Sc.D.

The species of this genus are poorly represented in American collections, and are, as a rule, uncertainly named. The adults are rarely taken by ordinary methods of collecting, and there is usually a great dearth of males: of *læta*, for instance, I know of only one ♂ example in all the collections seen. Several collectors have bred small series, and there seems to be no particular difficulty in obtaining adults in this way; but even in bred series females seem to be in the majority so far as I have been able to find.

The head is not prominent, yet scarcely retracted; moderate in size; front produced into a long, pointed process, more or less carinate, the sides somewhat explanate, varying in the species, the tip sometimes notched. As a rule the straight, hairy frontal vestiture conceals all save the extreme tip of this process, and the superficial appearance is that of a pointed hair tuft. The eyes are of good size, round, or nearly so, not protuberant, naked, without lashes or fringes. Palpi moderate, extending to the tip of the frontal process, vestiture of the second joint somewhat divergent, the third varying a little in its proportion to the sec-

ond. Antennæ extending to the middle of the wing, or a little beyond, simple in the female, joints somewhat marked, and with little tufts of short hair in the males. Tongue short, yet corneous; spiral and, perhaps, functional; but I doubt it. Thorax comparatively small, quadrate, with long, flattened hairy vestiture, forming no obvious tufts, yet fairly defining the patagia; the collar, however, is not relieved. Legs comparatively short, rather stout, middle and hind legs subequal; the former with longer femora, the latter with longer tibiæ. The vestiture varies somewhat in the species, but never forms specialized tuftings. Tibiæ unarmed save for the usual spurs, and not spinulated. Tarsi tending to taper toward tip, spinulation only moderate, the claws concealed by the vestiture. Abdomen very long, exceeding the angle of secondaries by nearly or quite half its length; very stout and cylindrical in the female, not much narrowed in the male; in both sexes with a terminal tuft. Primaries varying somewhat in proportion to the thorax, but always seem short and stumpy in proportion to the abdomen; the costa is a little arched, the inner margin subparallel, outer margin forming an appproximate rectangle at apex, thence obliquely rounded to a very obtuse hind angle. Secondaries proportionate. The venation offers nothing characteristic or different from the normal. On the primaries there is a little variation in the origin of veins 7–10; in *subflava* 7, 8 and 9 arise together from the end of the accessory cell, and 10 comes from the middle of the upper margin; in *oblonga* 7 and 9 are from the end of the accessory cell, while 8 is out of 9 half way to the apex, 10 being a little nearer the apex of the accessory cell; in *læta* the venation is as in *oblonga;* in *alameda* veins 7, 8, and 9 arise close together from the end of the accessory cell, but 8 and 9 are on a very short stalk and 10 is from the outer third of the cell. On the secondaries vein 5 is practically obsolete except in *alameda*, where it is quite obvious, but much weaker than the others. The studies on venation were made primarily on wings mounted in balsam, supplemented by examinations of other specimens from different localities. Very little variation is indicated, yet veins 7 to 9 of the primaries are those that are most subject to variation, and it is quite likely that there may be some divergence from the characters given here.

One of the most characteristic features of this genus is the peculiar structure of the female genitalia, which was figured and described by Dr. D. S. Kellicott for his *subcarnea*.* Seen from behind, there is the highly chitinized rim of an abdominal segment which covers a broad triangular upper sclerite; this sclerite has thickened edges which, as they extend backward, separate into two flattened lobes which turn downward and in part cover the

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*Bull. Buff. Soc. Nat. Sci., v, 1885.

anal opening. Almost meeting the tip of these lobes is a pair of lateral pieces bent from the under side so, when these are approximated, the inner structures are entirely concealed (Pl. VI, fig. 3). If these corneous structures are dissected out, cleared of scales and viewed laterally, the inferior side pieces are found to arise from the same base as the superior triangular process. Covered by these structures is a corneous portion furrowed into transverse ridges. The ovipositor opens below this ridged surface and does not appear in Pl. V, fig. 4, which illustrates this structure from the side. No other Noctuid genus studied by me shows any similar structure; hence *Nonagria* stands well by itself.

As to the use of this peculiar structure, Dr. Kellicott speaks as follows: "By means of this apparatus the eggs are placed for the winter. They are arranged, one after another, varying in number from a few to a hundred or more, in a tube formed by rolling over the margin of a withered dry leaf of the food plant. It appears that as the eggs are extruded and placed a little way back from the margin (about one-third the width), the same is then folded over the eggs and firmly cemented down, thus forming and filling the tube. The eggs thus covered with the leaf and cement appear to pass the winter under the snow, and more or less under water, unharmed.

"I have not been so fortunate as to see the moth in the act of oviposition, although a number were kept for many days with *Typha* in an aquarium. I found from time to time many of the eggs, but visits paid by day or by night failed to discover the manner of the work."

The species differ somewhat in the details of this structure; but this belongs rather to the discussion under the specific descriptions.

Eight species have been described from our fauna, three of them by Guenée, whose types I have seen in the British Museum. Two of the species—*enervata* and *fodiens*—were seen in 1891 and were found not properly referred to this genus; the third, *inquinata*, I saw in 1900, and this also is improperly in *Nonagria*. It is a *Tapinostola*, and probably *variana* Morr. The relation of our described species is not settled and the specific reference is not definitely made for that reason.

This leaves five nominal species, of which I have seen the types of the three described by Mr. Grote. Dr. Kellicott's species I have in specimens identified by himself and out of his type lot. *Læta* Morr., I have been unable to trace and have not seen the type. I have suspected a European species, but can find nothing to which the description fits. Mr. Grote described what he identified as the ♂ of *læta*, but intimates a doubt as to whether he really had Mr. Morrison's species. I have seen the specimens in the Thaxter collection, now in the Museum of Comparative

Zoology at Cambridge, and they agree perfectly with Mr. Grote's description; but I am also in doubt whether Mr. Morrison's description of the female really applied to this species, of which I have females only. But as there is no other to which the description applies, even approximately, I have adopted Mr. Grote's identification.

Of the names now in the catalogue, *oblonga*, *subcarnea*, and *permagna* apply to one species only, reducing the number of good species to three, and to these must be added a new form from the Pacific coast bred by Mr. A. Koebele some years ago.

Of three of these species I have material sufficient to study the male genitalia; of *læta* I have seen only one male, and that was not available for dissection. The matter is not so important in this genus as it would be in some others, because the characters seem to have no modification corresponding to the extraordinary female structures. On the contrary, they are extremely simple; the harpes are long, moderate in width, subequal to near the tip, but somewhat irregular; the tip rounded and varying a little in form. *Oblonga* seems to have no corneous clasper of any kind, and on this point I examined the *subcarnea* as well as the *permagna* forms and a series from California, lest I might be misled by superficial resemblance. *Subflava* and *alameda* have each a curved corneous clasper inserted at about the outer third of the harpes and projecting forward. The uncus is unusually thickened in all the species, but there seems to be nothing different in type from the usual Noctuid form.

Oblonga Grt., is the largest of the species, reddish gray in color, with minute black powderings, which tend to form in the male, a blackish shade along the median vein. The t. p. line may be represented by a simple or a double row of dots, or may be traceable as a denticulate line, the dots being the remains of the teeth. The ordinary spots are usually traceable as more reddish blotches in which the powderings are not present. Mr. Grote's original description was of an average male and fits that sex nicely; in the female all the maculation tends to become lost and the extreme in that direction is *permagna* Grt., represented in the series before me by Californian specimens which agree closely with the type from Florida. The normal form is described by Dr. Kellicott, and in this the t. p. line is punctiform, the orbicular is marked by one and the reniform may be marked by two dark dots.

Subflava is distinctly yellow in tinge, and has the veins more or less marked with smoky or blackish; the median vein is especially prominent, and at the end a diffuse spot tends to darken the vague reniform. The t. p. line is a series of venular dots and the terminal space is dusky in most examples. Females usually vary little except in size and in the general tinge of the ground color. The males are generally so different that, without a series,

I could hardly have persuaded myself that the undersized luteous red-brown forms really belonged here. The maculation may become entirely lost, and only the darkening along the veins will remain.

Alameda is a dull brown species in both sexes; the veins darker, the row of outer spots inconspicuous and only a vague tracing of the ordinary spots. As a whole, both sexes are a little more smoky than in the male *subflava;* but they are of the same general type, and the species are related.

Læta is distinctly red in tint, the tendency being to yellowish in the interspaces and to purplish brown on the veins. There is no trace of an outer line and the reniform is marked only as a vague darker shading at the end of the cell. The sexes are similar in appearance.

Altogether, as the species are arranged now, they are easily separable and should be recognized without much trouble.

NONAGRIA OBLONGA Grote.

Nonagria oblonga Grote, Papilio, II, p. 95, 1882.
Nonagria permagna Grote, Papilio, III, p. 73, 1883.
Nonagria subcarnea Kellicott, Can. Ent., XV, p. 175, 1883.
Nonagria subcarnea Kellicott, Bull. Bkln. Ent. Soc., VII, p. 86, 1884.
Nonagria subcarnea Kellicott, Can. Ent., XVI, p. 170, 1884.
Nonagria subcarnea Kellicott, Bull. Buff. Soc. Nat. Sci., V, p. 40, 1885.

Ground color a somewhat reddish gray or luteous, varying in depth and suggesting the flesh tint. Head and thorax immaculate. Abdomen only a little paler, also without maculation. Primaries with fine black powderings, which are fewer in the cell and submedian interspace, lightening this area, and which tend to mass along the median vein. T. a. line usually indicated by a blackish dot on the costa and another in the cell. T. p. line evenly outcurved over the cell, and continued in an even sweep about parallel with the outer margin. It may be a strongly dentate, nearly continuous single line, a series of interspaceal followed by a series of venular dots, or it may be a series of venular dots only, the dots representing respectively the inner and outer teeth of the complete line. There is a series of interspaceal black terminal dots. The orbicular is a blackish dot surrounded by a variably evident reddish shade, or by a circular area free from black powderings. Reniform a blackish dot at the termination of the median vein, supplemented by one above it nearer to the centre of the cell, and surrounded by a somewhat paler shading. Secondaries a little paler, sometimes with a more reddish flush, with an irregular, smoky, inconspicuous median shade line, and with a series of terminal dots or lunules. Beneath paler, primaries with the disc blackish outwardly, and with a blackish discal spot; secondaries more powdery, with a blackish discal spot and a somewhat irregular, diffuse, extra median band.

Expanse.—Male, 1.40–1.68 inches = 35–42 mm.
Female, 1.60–2.00 inches = 40–50 mm.

Habitat.—Rye, Westchester Co., N. Y., July 31 (Bird); Buffalo, N. Y., July (Kellicott); Newark, N. J. (Buchholz); Brockport, N. Y. (Bruce); Webster, N. H. (Goodhue); Chicago, Ill., Champaign, Ill., July 31, at electric light (Forbes); Los Angeles Co., Cal., in October (Koebele); Kittery Point, Maine (Thaxter); Fresno, Cal. (E. A. Schwarz).

The above localities are represented in the series of 17 specimens now before me. It is quite probable that the species will be found throughout the United States wherever the food plant (*Typha*) occurs. Florida should be added to the list of localities given, as the type of *permagna* was received from that State. The life history of the species is given by Dr. Kellicott in Volume V of the Bulletin of the Buffalo Society of Natural Sciences, and this shows one brood only, with a hibernation in the egg stage.

The general line of variation has been already referred to. The Californian examples are paler, and the secondaries have a rosy flush. They look different, but I have found it impossible to get any constant differential features. In the female the lateral inferior pieces have the tip distinctly emarginate, and this feature is constant and characteristic of the species.

The frontal process in this species is very long actually and in comparison with that of the other species, and it is slightly notched at the tip. Seen from the top the lateral margins are denticulate and a little flattened; seen from the side, the inferior portion of the front is extended for only a short distance beneath the process. In the male the projection seems, on the whole, somewhat less prominent than in the female, but there seems also to be a little individual variation in this respect.

NONAGRIA SUBFLAVA Grote.

Nonagria subflava Grote, Papilio, II, p. 95, 1882.

Nonagria subflava Grote, Bull. U. S. Geol. Surv., VI, p. 583, 1882.

Ground color yellow luteous in the female, reddish brown in the male, varying somewhat in the specimens. Head and thorax concolorous with the primaries, without obvious markings. Primaries somewhat powdery in both sexes. In the male the veins are black or smoky, with some white interrupting scales, median vein scarcely more prominent than the others. T. p. line a series of small venular dots tending to become lost. Terminal space vaguely darker in some specimens. Reniform a vague, somewhat lighter shade. In the female the contrasts are much better marked; the median vein is conspicuously darker and usually has a smoky shade accompanying it; most obvious at base and at the end of the median vein. The submedian vein is also more or less well marked basally. The terminal space tends to smoky brown, blackish on the veins, the apex nearly always free. T. a. line marked by venular dots in most specimens, but sometimes wanting. T. p. line nearly always obvious as a complete series of black

venular dots parallel with the outer margin. Reniform obvious, though diffuse, inferiorly clouded at the end of the cell, and sometimes marked at its upper border. Secondaries pale yellow in the female; darker, with a somewhat fuscous tinge in the male. Beneath, yellowish in the female, smoky in the male; disc of primaries darker and with a vague outer line; secondaries powdery along the costa. Abdomen concolorous with the secondaries.

Expanse.—Male, 1.20–1.40 inches = 30–35 mm.
Female, 1.20–1.68 inches = 30–42 mm.

Habitat.—Kittery Point, Maine, in September (Thaxter); Hamilton, Ontario; Winnipeg, Manitoba, August 31 (Hanham); Cartwright, Manitoba (Heath); Volga, South Dakota (Truman); Wisconsin, Iowa, Nebraska (Coll. div.); Champaign, Illinois, July 28, at electric light (Forbes); Chicago, August 3; Elizabeth, N. J., July 30 (Buchholz).

It is probable that the species will be found to occur throughout the northern and middle United States and throughout the British possessions to the Rocky Mountains, wherever conditions are favorable. Forty-three examples are before me, of which six only are males, and none are from any southern locality or from the Pacific Slope.

I have seen males that are very like the females in maculation, but darker in ground, and from that they vary to an almost uniform red-brown, with vague venular shadings. In the female there is not much variation; there may be an addition of reddish to the ground color, and there is more or less difference in the amount of contrast along the median vein and in the terminal space, but on the whole there is an obvious similarity throughout the long series before me. The difference in size is greater than the record indicates, for while there are some females as small as any males, the average female is larger than the largest male. Of the 37 female examples, 27 exceed in size the largest male of my series. I am not aware that this species has been actually bred, and know of no records to that effect. The frontal process is absolutely and relatively shorter than in *oblonga*, and, seen from the top, the margin is broader, almost explanate, the edge much more finely denticulate. The tip is obtuse, entire and a little turned down. Seen from the side the lower half of the front is extended, obviously to the tip of the projection, forming a more perfect cone.

In the female, the lateral pieces that bend upward from the lower margin have the tip rounded or obtuse, not in any way emarginate or excised; and this character holds true in all the specimens examined by me. Ordinarily, unless the specimen is very fresh and has all the anal vestiture intact, the form of these pieces can be discerned without much trouble.

NONAGRIA ALAMEDA, n. sp.

Ground color dull smoky red-brown. Head and thorax concolorous, immaculate. Primaries in the male dark brown; in the female lighter, with a somewhat yellowish tinge. No contrasting maculation in either sex. Veins narrowly black-marked. T. a. line obsolete in the ♂; in the ♀ may be entirely wanting or may be traceable for its full course as a narrow, smoky line, upright as a whole, outcurved in the interspaces. T. p. line a series of venular dots; very small black dots in the male; better marked, with larger dots, emphasized by white scales, in the female. A narrow, dusky, terminal line, followed by a pale line at the base of the fringes. Reniform scarcely traceable in the ♂, obscurely marked and yellowish centered in the ♀. Secondaries yellowish, with an obscure extra-median line in the female; darker with a smoky tinge in the male. Beneath yellowish with a smoky tinge; powdery; both wings with an exterior dark line or shades, primaries with the disc blackish.

Expanse.—Male, 1.28-1.48 inches = 32-37 mm.
Female, 1.48-1.56 inches = 37-39 mm.

Habitat.—Alameda County, California, July and August; red No. 231 (A. Koebele).

Type.—No. 6807, U. S. National Museum.

A series of eight examples, equally divided as to sex, is under examination, and there is a greater similarity between the sexes than in any previously described species. The males are as dark as any *subflava* and might even be mistaken for them except for the somewhat greater size and more sharply black-lined veins. The females range larger but not strikingly so, and they differ from the males chiefly in the lighter coloring throughout. The dotted t. p. line is greatly reduced here in both sexes, and in this point the species is also characteristic. In the head structure *alameda* resembles *subflava* closely save that, viewed laterally, the front does not extend so far beneath the process and the lateral edges are differently serrated. So, in the character of the female lateral structures, the resemblance is also to *subflava;* in fact the two species are closely related and should be found to have closely similar habits.

NONAGRIA LÆTA Morrison.

Nonagria læta Morrison, Proc. Bost. Soc. Nat. Hist., XVIII, p. 120, 1875.

Nonagria læta Grote, Papilio, II, p. 95, 1882.

Nonagria læta Smith, Bull. 44, U. S. Nat. Mus., p. 182, 1893.

All the head and body parts concolorous with the wings. Anterior wings brown, with a few longitudinal yellowish scales; all the veins dark, purple brown, contrasting, a blackish, diffuse discal spot; fringe concolorous, having a darker shading at the base. Posterior wings gray brown,

lighter and yellowish at base; fringe yellow. Beneath brownish yellow; central portion of the anterior wings blackish; discal dots distinct.

Expanse.—1.48 inches = 37 mm.

Habitat.—Hoboken, New Jersey.

The above is the essential part of Mr. Morrison's original description, and it applies fairly well to the small series of female specimens that I have before me.

Mr. Grote describes the male as follows: "Fore wings rich reddish brown, the veins nearly black; they might be called purplish black or brown. The interspaces have a paler, somewhat yellowish tint. No lines and no discal spots. Hind wings reddish brown, a little paler than primaries, and paler at base. Body duller and lighter brown. Beneath without marks, paler; disc of primaries a little blackish."

This description is equally characteristic for both sexes, and the absence of all trace of transverse posterior line is characteristic.

The specimens before me range from 38 to 40 mm., = 1.52–1.60 inches; but the ♂ is smaller. I have seen only the example from Kittery Point, Maine, from the Thaxter collection.

In the series at hand are examples from Iowa City, Iowa, July 27 (Wickham); Brockport, N. Y. (Bruce); Wisconsin; Louisiana; Plattsburgh, N. Y. (C. F. Hudson).

The range indicated by these localities is great enough to furnish more specimens than appear in collections; but nothing seems to be known of the early stages.

The frontal protuberance is characteristic in appearance; shorter than the others, the tip notched, the lateral margins toothed, with ridges extending from these teeth toward the central carina. From the side the appearance is equally characteristic, forming a downward angle toward the base. The figures on Plate V will give a better idea of these structures than words of mine can do. The lateral pieces of the female are not so definitely bent as they are in the other species, but are rather curved upward toward the broad overhanging anal lobes. The tip is finely serrated and is notched toward its inner angle, making the entire structure distinctive and clearly different from that found in any of the other species.

Finally, it might be suggested that collections need not remain so poorly supplied with species of this genus. They are not really rare, but rather retiring in habit. They do not come to sugar because the tongue is probably not functional; they fly to light, because we know that specimens have been so taken; but they are not greatly attracted by it and the captures are accidental. Throughout the summer larvæ may be found in *Typha* (cat-tails) and perhaps in other plants growing in similar localities. Careful investigation should discover the local breeding places, and after that the matter should be easy.

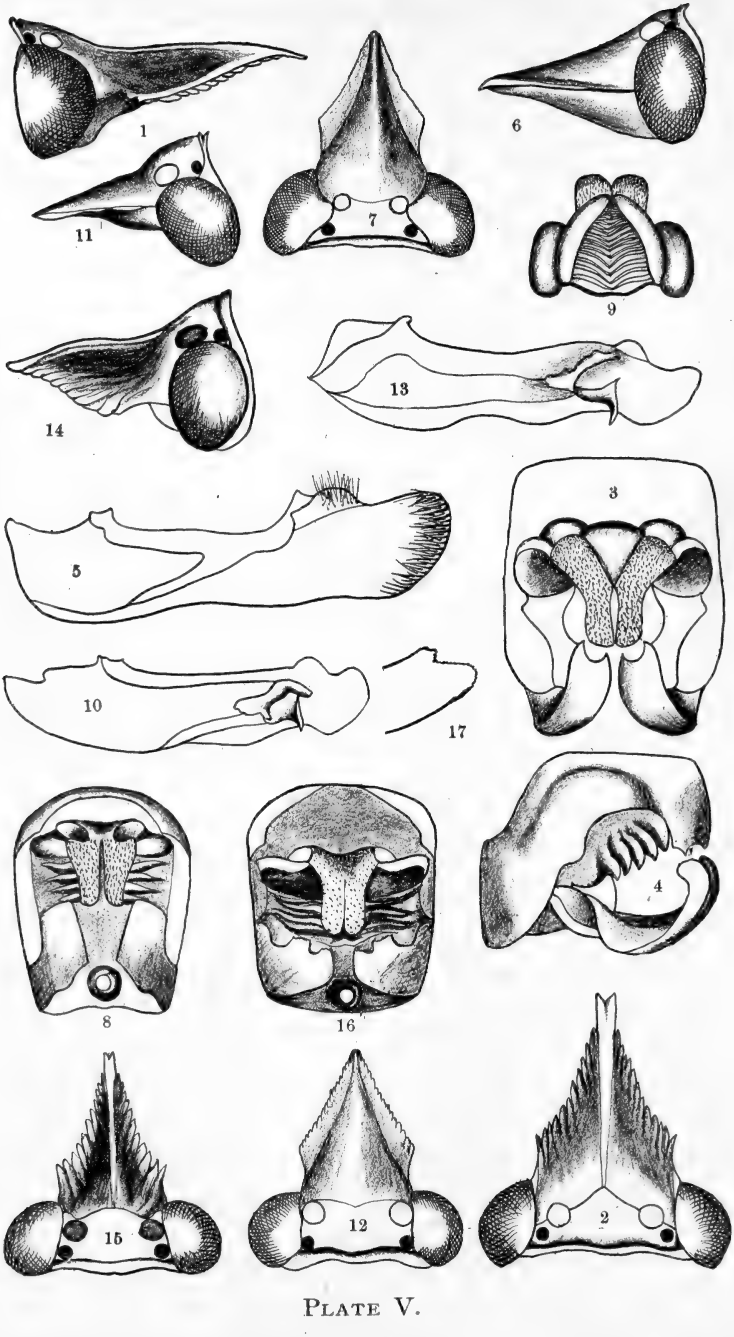

PLATE V.

EXPLANATION OF PLATE V.

1. *Nonagria oblonga*, head from side.
2. " " head from above.
3. " " genital structure of the ♀ seen from behind.
4. " " genital structure of ♀ removed from the body and seen from the side.
5. " " harpe and clasper of the ♂.
6. " *subflava*, head from side.
7. " " head from above.
8. " " genital structure of the ♀ seen from behind. The structure in *alameda* is practically like this.
9. " " anal plate of ♀ seen from above.
10. " " harpe and clasper of the ♂.
11. " *alameda*, head from side.
12. " " head from above.
13. " " harpe and clasper of the ♂.
14. " *læta*, head from side.
15. " " head from above.
16. " " genital structure of the ♀ seen from behind.
17. " " tip of the lower lateral piece of the ♀ genitalia.

—Mr. Ashmead, under the title "Some Remarks on Genera in the Mutillidæ," showed how three families had been confused with the Mutillidæ by various recent authors. He exhibited a number of interesting forms belonging to the families Thynnidæ, Myrmosidæ, and Mutillidæ, pointing out characters that easily separate them. He discussed André's classification of these insects as adopted in Wytsman's "Genera Insectorum," Family Mutillidæ. In his opinion André's subfamily *Methocinæ* was a very unnatural group, part belonging to the *Thynnidæ* and part to the *Myrmosidæ*. André has also suppressed some good genera that will ultimately be recognized as valid.

Dr. Howard, discussing Mr. Ashmead's paper, related a curious superstition in regard to Mutillidæ from the folk-lore of the Mississippi negroes. A dog which is cowardly and not a good fighter may, according to these negroes, be endowed with a courageous and pugnacious spirit by being made to drink from a decoction of boiled Mutillids, or "bull-dog ants," as they are

called. He remarked that in the Thynnidæ the males are larger than the females, an exception to the rule obtaining among most insects. Other examples of insects in which the male sex is the larger were mentioned by other members present.

—Dr. Dyar presented the following paper:

A REVIEW OF THE NORTH AMERICAN SPECIES OF THE LEPIDOPTEROUS FAMILY ANTHROCERIDÆ.

By Harrison G. Dyar.

This group of moths has been usually known as Zygænidæ, but erroneously so, as shown by Kirby. Fabricius founded the genus *Zygæna* in 1775, with 28 species included, belonging to several genera and families as now known, and with no indication of type. The first species is *filipendulæ*, and if this be taken as the type, the usual acceptance of the term Zygænidæ is justified, and this becomes the name of the moths under discussion. But by the method of elimination we reach a different result. Scopoli, in 1777, founded the genus *Anthrocera*, specifying as type *filipendulæ*, the first of the Fabrician species of *Zygæna*. Retzius, in 1783, proposed the genus *Adscita*. I have not seen the work, but the genus is said to have included only *filipendulæ* and *statices*. As the species are not congeneric, and *filipendulæ* was already the type of *Anthrocera*, *statices* may be considered that of *Adscita*. Schrank, in 1801, treated the genus *Zygæna*, dividing it into three sections. I am indebted to Prof. Fernald for examining Schrank's work for me. He tells me that section A contained *phegæa* only, section B ten species, among them *filipendulæ*, and section C two species, *globulariæ* Schrank (not Hübner) = *statices* Linn. and *pruni* Den. & Schiff. These sections were not named, but if names were to be applied to them, B should be called *Anthrocera*, as it contains *filipendulæ*, and C *Adscita*, as it contains *statices*. This constitutes a virtual restriction of *Zygæna* to section A, which contains only *phegæa*. Thus *phegæa* becomes the type of *Zygæna* Fab. (restr. Schrank). It is the second species included by him in the 28 original species. The above is essentially Kirby's argument. Unfortunately it overturns our accustomed use of the family names, since *phegæa* is a Syntomid allied to the Arctians, and thus *Zygæna* is to be used for a high Bombycid type instead of the well known Tineid group with which we are accustomed to associate the name.

The earliest plural name for the group is Hübner's Zygænæ (1806), with *filipendulæ* as type, but, as shown above, this name cannot be used. Hübner also proposed Chrysaores (*statices*) and Glaucopes (*phegæa*), but, as *Chrysaor* becomes a synonym of *Adscita* and *Glaucopis* (preoccupied in birds) of *Zygæna* Fab.

(restr. Schr.), neither of these terms is admissible. Latreille used Zygænides (1809), and Leach, Zygænidæ (1819), neither being admissible. Westwood and Humphrey proposed Anthroceridæ in 1857, which name should obtain.

The American Pyromorphidæ, as pointed out by Hampson and Packard, cannot rightly be separated as a family from the Anthroceridæ. This separation was made by Smith in an effort to bring some order out of the jumble of forms associated under the term Zygænidæ by Packard and Grote, and was followed by Neumoegen and Dyar, who gave as a diagnostic character the presence of but seven veins in the hind wings. But this does not hold, and is not of family rank in those forms that show it, since it is caused by the disappearance of vein 6. Comstock and Hampson describe this condition as produced by the coalescence of veins 6 and 7, but I do not see any proof of this in the material before me. It looks rather like an obsolescence of vein 6, as takes place with vein 5 in other groups. This seems best shown in *Triprocris smithsonianus*, where there is a wide space between veins 5 and 7, with a fold in the position of vein 6, and even a slight irregularity in the cross-vein at its proper position of origin, though there is no trace of the vein itself. If it were a case of coalescence, I should expect to find some of our species with veins 6 and 7 stalked, or at least approximate at origin.

The Anthroceridæ belong to the Tineoidea, as the wings have vein 1c present. The frenulum is present, tongue well developed, middle spurs of hind tibiæ obsolete, antennæ pectinate in our species, the tip slightly thickened or flabellate. Vein 8 of hind wings is joined to the cell at outer two-thirds or end, and the upper border of the cell is often weak. The larvæ are flattened, elliptical, with small retracted head, the tubercles converted into low warts, tubercles i and ii, iv and v united. This type of structure is carried to its fullest development in the Cochlidiidæ, which these larvæ somewhat resemble. Our species fall in Kirby's subfamily Anthrocerinæ, or Hampson's Chalcosiinæ.

Family ANTHROCERIDÆ Westwood and Humphrey.

Sphinx adsita Linnæus (part), Syst. Nat., p. 495, 1758.

Zygæna Fabricius (part), Syst. Ent., p. 550, 1775.

Anthrocera Scopoli, Introd. Nat. Hist., p. 454, 1777.

Adscita Retzius, Gen. Spec. Ins., 8, p. 35, 1783.

Zygæna Schrank (part), Fauna Boica, II (1), p. 236, 1801.

Zygæna Latreille (part), Hist. Nat. Gen. Part. Crust. Ins., III, p. 402, 1802.

Zygænæ Hübner, Tentamen, 1806.

Chrysaores Hübner, Tentamen, 1806.

Zygæna Latreille (part), Gen. Crust. Ins., IV, p. 212, 1809.

Zygænides Latreille (part), Gen. Crust. Ins., IV, p. 211, 1809.
Not *Zygæna* Cuvier, Reg. Anim., II, 1817. (Fishes.)
Zygænidæ Leach, Edinb. Encycl., IX, p. 131, 1819.
Zygænides Boisduval, Icones., II, p. 34, 1834.
Not *Zygæninæ* Swainson, Classif., 1839. (Fishes.)
Zygænoidea Gravenhorst, Vergl. Zool., p. 168, 1843.
Zygænides Walker, Cat. Brit. Mus., I, p. 62, 1854.
Anthroceridæ Westwood & Humphrey, Brit. Moths, I, p. 27, 1857.
Glaucopites Newman, Ent. Mo. Mag., I, p. 384, 1864.
Zygænidæ Staudinger, Cat. Lep. Eur. Faun., I. p. 44, 1871.
Zygænidæ Stretch, Zyg. Bomb. No. Am., I, p. 33, 1872.
Glaucopes Grote, New Ch. List No. Am. Moths, p. 14, 1882.
Pyromorphidæ Smith, List Lep. Bor. Am., p. 22, 1891.
Anthrocerinæ Kirby, Cat. Lep. Het., I, p. 62, 1892.
Not *Zygæninæ* Kirby, Cat. Lep. Het., I, p. 89, 1892. (Syntomidæ.)
Zygænidæ Hampson, Moths of India, I, p. 228, 1892.
Pyromorphidæ Neumoegen & Dyar, Journ. N. Y. Ent. Soc., II, p. 63, 1894.
Pyromorphidæ Comstock, Man. Stud. Ins., p. 226, 1895.
Zygænidæ Hampson, Cat. Lep. Phal. Brit. Mus., I, p. 20, 1898.
Anthroceridæ Tutt, Brit. Lep., I, p. 385, 1899.

Synopsis of North America Genera.

1. Vein 6 of the hind wings absent 2
   Vein 6 of the hind wing present 5
2. Vein 8 joined to the cell by an oblique bar at the end 3
   Vein 8 joining the cell at the outer two-thirds .... *Acoloithus*
3. Abdomen of ♂ with lateral and terminal tufts 4
   Abdomen without tufts .... *Triprocris*
4. Anal area of hind wings much reduced .... *Setiodes*
   Anal area of hind wings not reduced .... *Harrisina*
5. Vein 8 joined to cell by an oblique bar at end 6
   Vein 8 joined to cell at outer two-thirds .... *Adscita*
6. Wings broadly rounded .... *Pyromorpha*
   Wings trigonate, normal .... *Gingla*

Genus ACOLOITHUS Clemens.

Synopsis of Species.

Collar discolorous, red or orange .... *falsarius*
Collar concolorous, black .... *rectarius*

Acoloithus falsarius Clemens.

A common species in the southern Atlantic coast region, the larva sometimes injurious to the grape. The larvæ are solitary, whitish, with dull purple longitudinal side bands and cross bands near each extremity.

Larva: Flattened, squarish, head retracted, feet short, on joints 7 to 10 and 13. Three rows of low, flattened warts with short, stiff hairs, those from the third row (tubercles iv + v) longer. Pale olivaceous or pinkish; a broken black dorsal line with adjacent dots on joints 5 and 11 before the upper wart; a line above and below the second wart (tubercle iii), broken in the incisures, a little curved on each segment, the upper one bordered above faintly by white. Upper two warts blackish, the third pale except on joint 6. Spiracle on joint 5 moved up. An eversible area around the spiracle on joints 6 and 11. Hairs finely segmented with a clear bulb at the extreme base, dusky on upper warts, pale on third. Another row of warts present on the thorax. In a green specimen the dorsal markings on joints 5 and 10–11 are larger. It has the appearance of a narrow dorsal and broad lateral gray bands. The larvæ are small; length, 8 to 9 mm. They very much resemble the holes which they eat in the leaves. Winter passed as chrysalis in cocoon.

Described from larvæ from Rhinebeck and Lake Ronkonkoma, New York.

Acoloithus rectarius Dyar.

Inhabits Arizona. I have it from Chiricahua Mts. (H. G. Hubbard) and Huachuca Mts. (Dr. W. Barnes). The larva is unknown.

Genus HARRISINA Packard.

SYNOPSIS OF SPECIES.

1. Collar discolorous, red or orange 2
   Collar concolorous, black 5
2. Fore wings with veins 8 and 9 coincident .... *americana*
   Fore wings with veins 8 and 9 separate 3
3. Dull black, scarcely shining 4
   Shining greenish black .... *metallica*
4. Neck below and coxæ black .... *texana*
   Neck below and coxæ overspread with the orange of collar ..... *australis*
5. Wings shining greenish black .... *coracina*

Harrisina americana Harris.

The well-known grape vine feeder of the Eastern States, ranging over the whole Atlantic coast. I have specimens from Eustis, Florida, and Long Island, New York. The larvæ are gregarious, eating the leaf in a row, side by side. They are yellow, with the warts black.

Larva: Stage I. Gregarious. Head large, retracted under joint 2, body flattened, squarish, segments distinct. Single setæ represent the warts. Those of the upper two warts (i + ii and iii) are stiff, black, with a clear bulb at the extreme base, that representing the third wart (iv + v) is soft white, spinulose, without bulb. Color, pale yellow, the skin sparsely granular.

Stage II. Of the same yellowish color without marks. Instead of the

setæ are now large warts as in the mature larva, the upper two with a bunch of stiff spines with black tips, the third with hairs fine, white, spinulose. Head pale.

Stage III. Head retracted, pale, eye black, mouth brown. Cervical shield large, covering most of joint 2. Body squarish, thick, all pale yellowish. Hair short, bristly, blackish tipped in wart i + ii, softer subventrally; some long hairs extending over the head. With growth all the warts become light vinous red except those on joint 7, which are concolorous, and on joint 9 where only the upper wart is red.

Stage IV. Yellowish, cervical shield and three upper warts purple brown except the warts on joint 7 and the second and third on 9, which are pale vinous. Hair very short, stiff, but on joints 3 and 13 are some long ones. Feet short. Lateral and subventral regions less yellow than the dorsum.

Stage V. Yellow to the lateral warts, the incisures greenish. Four rows of warts and shield black with short stiff hairs, a few long white ones from the ends.

Stage VI. No change. I am not absolutely certain whether there are five or six stages Spiracle on joint 5 moved upward. A small area around the spiracles on joints 6 and 11, incising the third wart of those segments, is white and eversible. Head strongly retracted. Hairs pointed, subspicular or nearly smooth with clear bulbs at the extreme base. Skin with fine, clear granules, not quite contiguous. Segments pigmented with yellow centrally, transparent in the incisures. Cervical shield and four rows of warts black. Five warts on joints 3 and 4.

Described from larvæ from Bellport, New York.

Harrisina texana Stretch.

I have referred this as a synonym of *americana*, but, perhaps, wrongly. Stretched separated his species on the presence of another vein (vein 8) in the fore wings. Such specimens are taken not only in Texas, but in New Jersey and New York, along with *americana*, and I thought it to be a case of variation. However, there are two different forms of larva in our region. Mr. Doll tells me that the moths from them are "just alike," but they may differ in venation. The following is a description of the different larva. It occurs on woodbine:

Larva: Head retracted and concealed within joint 2. Body flattened, sides nearly perpendicular, with a distinct substigmatal ridge. Four rows of low flattened areas, representing warts, granular, and bearing numerous radiating short, fine bristles, and a few longer white hairs from the extremities. First wart subdorsal, second lateral, third substigmatal, and fourth obscure above the bases of the legs. The dorsum of joints 3 to 13 is broadly bright yellow, banded between each joint with blackish, and again across the middle of each, including the warts, with purple brown. The bands all join a broad, lateral, purple brown band which runs the whole length, covers the subventral warts on joints 2 and 3 and the whole subventral region on 4 and 5. Substigmatal ridge on joints 6 to 13 white,

as are also the venter and legs, but more greenish tinted, especially just below the ridge. Thoracic feet brown. Head black, long, shining, the long antennæ brownish; width, about 1 mm.

Described from larvæ from Boston, Mass.

Harrisina australis Stretch.

This form occurs in Florida and Missouri. I have it from Indian River and Enterprise, Florida, and Kirkwood, Missouri. I have referred it as a southern variety of *americana*, but it is, perhaps, referable rather to *texana*, if that is distinct. A series were bred at the Department of Agriculture in August, 1892, under the number 3548, received from Miss Mary Murtfeldt. The larva, as I see from the notes, was like the woodbine form described above under *texana*. Three of the moths are *australis*, even the front legs being partly yellow. A fourth has less yellow below. Another series, bred June, 1888, under the number 158, from Florida, are *australis* as to color, but some of them have veins 8 and 9 of fore wings coincident as in *americana*. If it were not for the two kinds of larvæ, I would not hold these three forms separate. The matter must be investigated further.

Harrisina metallica Stretch.

I have one specimen from Professor Cockerell, a male. Prof. Cockerell* thinks that this may be a dimorphic form of the folfowing species, but they differ markedly in the color of the collar, and I have both sexes of the other species. Therefore, I keep them separate pending further evidence.

Harrisina coracina Clemens.

The species is shining greenish black with black collar, shaped as in *americana*. The larva has curious transverse bands on certain of the segments.† I am of the opinion that neither the name *coracina* Clem. nor *nigrina* Graef, which has been referred as a synonym of it, really refer to this species, but that both of them refer to *Gingla marteni* French, I have the latter from Texas, but the present species only from Arizona. I await an opportunity to examine the type before proposing a new name for this form. If Prof. Cockerell is right, the name *metallica* will cover it.

Genus SETIODES Herrich-Schaeffer.

Setiodes bahamensis Dyar.

This species has not been recorded from North America, but occurs very close to our shores, and may yet be found in southern Florida. I have described the larva.‡

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* Psyche, VIII, p. 120, 1897.

† Psyche, VII, p. 306, 1895.

‡ Ent. News, X, p. 100, 1899.

Genus TRIPROCRIS Grote.

SYNOPSIS OF SPECIES.

1. Black, without yellow or red marks..... 2
   Wings with yellow or red markings.. 3
2. Smallest, expanse 13-22 mm......... ....*smithsonianus*
   Larger, expanse 28 mm...*aversus*
   Largest, expanse 33 mm............. ....*lustrans*
3. Fore wings largely red.. ....*constans*
   Fore wings largely yellow... ....*sancta*
   [*desertus*]

Triprocris smithsonianus Clemens.

Not uncommon in the Rocky Mountain region, Colorado and Arizona. I have described the larva on *Allionia nyctaginea*.*

Triprocris aversus Hy. Edwards.

This species is not before me, and may not be correctly referred generically. It was described from Mexico, but recorded from Arizona from specimens in the collection of Dr. Barnes, I believe.

Triprocris lustrans Beutenmüller.

Very similar to *smithsonianus*, but much larger and differing in venation. In *smithsonianus*, veins 8 and 9 of fore wings are coincident, 10 separate. In *lustrans*, 10 is stalked with $8 + 9$. I have a specimen that I got from Mr. Oslar, collected in Colorado, and another from Tlalpam, near Mexico City, Mexico, from Mr. R. H. Hay.

Triprocris constans Hy. Edwards.

This is not before me, but is presumably referable to this genus.

Triprocris sancta Neumoegen & Dyar.

I have specimens from Fort Grant (Hubbard), Chiricahua Mts. (Hubbard), and Bright Angel, Arizona (Schwarz and Barber), the latter taken between June 17 and July 20.

Triprocris desertus Hy. Edwards.

Described as a *Lycomorpha* (Syntomidæ) and the types are lost. I include the name only so as not to lose sight of it pending the discovery of more specimens.

Genus ADSCITA Retzius.

SYNOPSIS OF SPECIES.

Fore wings marked with ocherous yellow............. ....*rata*
Fore wings marked with red..*latercula*

Adscita rata Hy. Edwards.

My specimens are all labelled "Ariz.", without exact localities or dates.

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*Proc. Ent. Soc. Wash., v, p. 33, 1902.

Adscita latercula Hy. Edwards.

I have a series from Chiricahua Mts., Arizona (Hubbard). No larvæ are known in this genus in America.

Genus PYROMORPHA Herrich-Schaeffer.

Synopsis of Species.

Costal yellow patch of fore wings large, no yellow on hind wings, *dimidiata*

Costal yellow patch small, a yellow patch at base of hind wings, *centralis*

Pyromorpha dimidiata Herrich-Schaeffer.

The species occurs in dry oak woods in the Eastern States. The larva feeds on dead leaves under which it lives. I have described it.*

Pyromorpha centralis Walker.

No specimen is before me, the record as North American being made doubtfully from a specimen which Dr. Barnes has, said to come from Florida. The species is Mexican.

Genus GINGLA Walker.

Synopsis of Species.

1. Wings black.................................... 2
   Wings red basally.................................... *laterculæ*
2. Body black.................................... *marteni*
   Thorax above and abdomen at sides ocherous.................................... *fusca*

Gingla marteni French.

I have this form from Texas and Arizona. The larva is unknown. The earliest name will probably prove to be *coracina*, as I state above. The moths have veins 8 and 9 of fore wings shortly stalked.

Gingla fusca Hy. Edwards.

I have but one specimen. It has veins 8 and 9 of fore wings separate, but approximate at base.

Gingla laterculæ Dyar.

One type is before me. It has veins 8 and 9 of fore wings coincident.

—The following papers were submitted for publication:

NOTES ON THE ORTHOPTERA OF BERMUDA WITH THE DESCRIPTION OF A NEW SPECIES.

By A. N. Caudell.

This article is the result of a perusal of that portion of Prof. Verrill's recent work† treating of the Orthoptera of Bermuda.

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* Psyche, VIII, p. 128, 1897.

† "The Bermuda Islands, an Account of their Scenery, &c.," 8vo, New Haven, 1902.

It is to be regretted that the latter was not submitted in manu script for approval to a specialist, as was evidently done in certain other orders. The nomenclature is not recent, and at least two recorded species are omitted. The following notes are submitted as corrections and additions to Prof. Verrill's article:

Stenobothrus maculipennis Scudder.

This species belongs to the genus *Orphulella*, and is a synonym of *O. pelidna* Burm.

Stenobothrus bilineatus Scudder.

This species is also a member of the genus *Orphulella*, and is synonymous with *O. speciosa* Scudd.

Orphulella olivaceus Morse.

This species is not mentioned in Prof. Verrill's work, but is recorded as occurring in Bermuda by Prof. Scudder.*

Schistocerca americana Drury.

This handsome insect has apparently never been recorded from the islands, and Prof. Verrill seems not to have met with it. The National Museum contains two female specimens bearing the label "Bermuda I," but no collector or date. This appears to be the only representative of the Acridiinæ thus far taken on the islands.

Conocephalus dissimilis Serville.

This is a synonym of *C. triops* Linnæus.

Conocephalus fuscostriatus Redtenbacher.

This species has been recorded by Prof. Scudder,† as having been taken on the islands by C. M. Weed.

Orchelimum vulgare Harris.

This species appears in Scudder's Catalogue as a synonym of *O. agile* DeG.

Gryllus bermudensis, n. sp.

General color testaceous with lighter markings. Head moderately prominent, as wide as the thorax; eyes piceous, and a similarly colored band across the occiput. From each end of this transverse bar a fuscous stripe extends back to the posterior border of the head. The sides of the head and the greater portion of the face is light yellowish. Thorax one and one-half times as broad as long, light testaceous with quite uniform infuscation on each side of the center above and on the posterior portion of the upper half of the lateral lobes, which are strongly inflexed posteriorly. This inflexion of the posterior portion of the lateral lobes and the infuscation of the upper part seems quite constant, being present in the immature specimens as well as in the adult. Elytra not quite reaching the tip of

* Psyche, VIII, p. 43, 1897, and Can. Ent., XXXI, p. 187, 1899.

† Psyche, VIII, p. 43, 1897.

the abdomen, testaceous, the veins of the lateral field and the dividing vein lighter. Wings of the same length as the tegmina. Abdomen almost black, cerci lighter. Ovipositor piceous, longer than the posterior femora. Legs testaceous, immaculate.

Length, exclusive of the ovipositor, 22 mm.; pronotum, 5 mm.; posterior femora, 14 mm.; ovipositor, 16 mm.; width of thorax, 7.5 mm.

One female, adult; two males, immature.

Type.—No. 6819, U. S. National Museum.

These specimens bear only the locality label. The species seems somewhat allied to *G. personatus* Uhl., but the color is much darker and the lateral lobes are more strongly inflexed posteriorly. The markings also are somewhat different. It is also allied to *G. domesticus* Linn., but it is decidedly larger and darker than any specimen of that species that I have seen.

Prof. Scudder* mentions a species of Gryllus, taken by Weed in Bermuda, as presumably new; but it has never been described and may be the one here described, or it may be either *G. abbreviatus* or *pennsylvanicus*.

Periplaneta americana Linnæus.

Prof. Verrill's figure 198 is certainly not that of this species, as both sexes of *americana* have the wings extending beyond the tip of the abdomen.

Stylopyga orientalis Linnæus.

This species belongs to the genus *Blatta*, of which it is the type.

Panchlora surinamensis Linnæus.

This belongs to and is the type of Brunner's genus *Leucophæa*.

Panchlora maderæ Olivier.

This species has been removed from *Panchlora* by Dr. Krauss, and forms the type of his genus *Rhyparobia*.

Ectobia germanica Linnæus.

This belongs to my recently established genus *Blattella*†, which replaces the preoccupied genus *Phyllodromia* of Serville. *Germanica* is the type of the genus.

ON THE CICINDELIDÆ OF SOUTHERN VENEZUELA, COLLECTED BY EDWARD A. KLAGES, 1898–1900.

By Dr. Walther Horn, M. D., Berlin, Germany.

In the collection made by Edward A. Klages in the southern parts of Venezuela the family Cicindelidæ is represented by not less than 16 species and one variety. The new species of *Te-*

* Psyche, VIII, p. 43, 1897.

† Proc. Ent. Soc. Wash., V, p. 234, 1903.

tracha I describe here is the most wonderful form known till now, standing quite alone in the genus.

Tetracha (Phæoxantha) klugi Chd.

One specimen only. Attracted by the light in the tent at Ciudad Bolivar in early June.

Tetracha (Phæoxantha) æquinoctialis Dej.

This very active beetle, whose ground color is like the sand upon which it is found, was taken along the margin of a stream near Ciudad Bolivar during May, June, and November. The elytra are less punctured than in the Amazonian specimens, and the vertex is yellow-brown. I cannot distinguish this species from *T. bifasciata* Brll., which I consider but a variety of the former.

Tetracha klagesi, sp. nov.

Species mirabilis valde singularis, novam sectionem in genere constituens!

Tetr. oxychiloidi m. paullulum affinis, valde major tota cyanea; pectoris medio abdominisque apice nigricantibus; capite minore, fronte pronotoque subtilissime alutaceis (opacis), impressionibus 2 interocularibus (discoidalibus) levissimis; mandibulis et labro nigris, hoc paullo latiore antice recte truncato bidentato, dentibus brevibus; antennis valde longioribus, sed brevioribus quam in Phæoxanthæ specibus, articulis 4 primis nigris. Prothorace longiore angustioreque quam in *Ph. æquinoctiali* Dej., angulis anticis paullo minus productis, sulcis pronotalibus profundioribus (levioribus quam in *Tetr. oxychiloidi* m.)—fere ut in *Ph. cruciata* Brll.—margine laterali ipso breviter reflexo (non serrulato), prothorace pone sulcum apicalem et ante sulcum basalem magis constricto (ut margo magis sinuatus videatur) quam in *Ph. æquinoctiali* Dej., angulis posticis applanato-rotundatis magisque prominulis. Elytris fere ut in *T. oxychiloidi* m., marginem versus paullo minus declivibus, crista marginali (quinta parte humerali et apicali excepta) sat late applanato-reflexa, apice singulo paullo magis prolongato sed latius rotundato-truncato, humeris minus prominulis, superficie tota immaculata modice splendente, densius sculpta, epipleuris convexioribus; impressionibus anteapicalibus elytrorum valde evidentioribus anticemque versus prolongatis. Pedibus longioribus; trochanteribus femoribusque rufo-brunnescentibus, horum apice modice late nigro-annulato; tibiis testaceis (subtus nigro—aut brunneo—lineatis: extremo apice basique angustissime obscuratis); tarsis brunneo-nigricantibus, articulis hinc inde—præsertium maxima parte superficiei articuli primi—dilutioribus; palpis testaceis. Long. 20–22 mm., sine labro.

1 ♀, ♂♂. This regal species occurs in the Parima Mountains, and was discovered running along the borders of a small stream at dusk. It runs in a zigzag course with marvelous rapidity—exceeding that of its nearest kin—and makes its appearance only after sunset. Found in May and early June at an elevation of

2,500 to 3,000 feet. It gives me great pleasure to dedicate this beautiful beetle to my friend Mr. Klages, especially as the hardships resulting from the trip to its habitat nearly cost his life, and it is the best of the few things taken there.

Tetracha lacordairei Gory.

One specimen taken while digging in a cornfield near Ciudad Bolivar about the middle of June.

Tetracha affinis Dej., var. **smaragdina** Thms.

Found on sandy roads quite distant from any water. At Ciudad Bolivar during June and July, and at Suapure in May and July.

Tetracha sobrina Dej., var. **sommeri** Chd.

Found in damp places along the margin of a stream near Ciudad Bolivar in May and June.

This species is one of the most variable of the genus! Only "*geniculata* Chev." and "*ignea* Bat." are now noted in the catalogues as varieties of *Tetr. sobrina* Dej.; but after a careful study of the relationships of the "closely allied" forms, I now believe that the following are but varieties of the same species:

Tetr. sobrina Dej. subspecies **punctata** Cast.
" **confusa** Chaud.
" **infuscata** Mann.
" **longipennis** Chaud.

As regards *T. Chevrolati* Chaud., it is quite distinct from subsp. *infuscata* Mann. and belongs to the varieties of *T. carolina* L., as does subsp. *chiliensis* Brll. and var. *Latreillei* Cast., var. *splendida* Dokht., etc.

Tetracha mellyi Chaud.*

Found on the dry, sandy borders of a stream near Ciudad Bolivar during May and June, and occasionally came in to the light. Some of the latter show a coppery coloration somewhat like in *T. fulgida* Klug, and have the last two abdominal segments with the border of the preceding two yellow. The sixth ventral segment is emarginate in the ♂, but the emargination is not rounded in front as it is in the commoner variation, which also differs in having the last four ventral segments pale yellow.

Cicindela suturalis F., var. **helvæa** Klug.

A very active species found during the hottest hours of the day along the sandy margin of a stream near Ciudad Bolivar from March to the middle of June.

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* I am not quite sure if this form is really only one of the varieties of *T. fulgida* Klug. In regard to the sculpture of the elytra, it may prove to be a separate species.

Cicindela argentata F.

Found in the jungle, and occasionally flew in to the light at night during May, June, July, August, November, and December at Ciudad Bolivar.

Cicindela argentata F., var. **pallipes** Fet.

A single specimen came in to the light in early June near Ciudad Bolivar.

Cicindela affinis W. Horn.

One specimen was taken at light near Ciudad Bolivar in early June, but a number were found on the clayey bank of the river at Suapure during June and July.

Prepusa ventralis Dej.

This came in to the light near Ciudad Bolivar in early June. It is likely an inhabitant of the jungle.

Pentacomia egregria Chaud.

One specimen taken at midday on a clayey bank a fourth of a mile from the forest at Suapure in June.

Odontochila cayennensis F.

Found at Suapure in March, April, May, June, and December; also in the Parima Mountains up to 3,000 feet.

Odontochila confusa Dej.

Suapure, May and June.

Odontochila margineguttata Dej.

Suapure, March, April, May, June, August, and December. *O. rugatula* Bat., described as a distinct species from the Amazons, is but a slight variation of it.

Odontochila lacordairei Gory.

Suapure, April, May, June, and November,

All the species of *Odontochila* were found running about in the shade of the virgin forest where there was but little undergrowth. Their habits are quite similar, excepting that *cayennensis* F. would occasionally, upon being disturbed, seek temporary refuge by flying onto foliage, but never more than a few feet above ground. The several species are quite wary and, on account of their dark colors, are not conspicuous objects among the dead leaves which carpet the ground throughout the forest, outside of which none of these species were ever met with.

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ERRATA.

Page 43, line 1, for *rubicundulum* (Say) read *vicinum* (Hagen).
127, line 16, for 1886 read 1889.
127, line 17, for 1903 read 1906.
246, under *Ardoptera*, for 106 read 105.
252, for **Leptopeza** read **Lemtopeza.**
253, under **Microphorus,** for 14 read 139.
255, under **Platypalpus,** for 194 read 92.
259, couplet 7, for *Leptopeza* read *Lemtopeza*.

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